ELECTRICAL REVIEW

14th MARCH 1952

OLDEST ELECTRICAL PAPER • ESTABLISHED 1872 • VOL. CL • NO. 3877

Councils' Choice

BEFORE the war the choice between gas and electrical equipment in the home was largely a matter for the individual householder. Now that most house building is in the hands of local authorities the position is different; one decision may settle the kind of service to be provided throughout an entire estate. Possibly tenants may later be allowed to change to another type of equipment, but this will generally be at their own cost, whereas the existing appliances will be free. It is therefore a matter of considerable importance to the electrical industry that local authorities shall have full regard for the merits of electricity in the home.

Electricity has an advantage over gas in that, if only one service is to be installed, it alone can fulfil all present-day needs. On the other hand an electrical installation and the equipment for heating and cooking are admittedly rather more expensive than their gas counterparts—and just now local authorities are concerned to cut down costs wherever practicable. A subject which has received some publicity of late is the respective costs of maintenance of the two services and here also the advantage is inherently with gas. Provided they are treated with care, electrical appliances may and do last for years without needing attention, but this care is not always evident where the user does not bear the cost of repairs. Formerly a large proportion of the heavier domestic appliances were supplied on simple hire, and maintenance expenditure was hidden in the rentals charged by the electricity undertakings, but for the most part these facilities have now been withdrawn. The effect on local authorities is that repairs have become an item of some consequence in considering which service to adopt, and in a recent case this factor influenced a Council to equip a large estate for gas. Undoubtedly there must be some tenants who prefer one service and some the other. Why not then provide an adequate number of points, both gas and electric, and let the tenants bear

the responsibility of providing the equipment of their choice perhaps assisted by the electricity and gas authorities? In the days of the kitchen range and the built-in copper these had of necessity to be considered as part of the house, but this does not apply with the more mobile gas and electrical equipment of to-day.

"DANGEROUS" MACHINERY

An important decision was made by the House of Lords last week when the judgments of two Scottish Courts were confirmed on appeal. The case concerned an apprentice who claimed damages from his employers (a firm of machinery makers) after receiving injuries from an unguarded machine which had been made in the factory and he had been set to clean. The claim was based on common-law negligence and breach of statutory duty. The claimant relied upon the sections of the Factories Act, 1937, requiring dangerous machines to be fenced and forbidding the cleaning of machinery in motion by "young persons." Their Lordships held that these provisions applied only to machinery used for production purposes; they did not cover machines made in a factory.

PROFESSIONAL APPOINTMENTS

More work was done last year by the Professional Engineers' Appointments Bureau, to which there is further reference on another page, in helping employers who had vacancies to fill as well as engineers seeking new jobs, or a change of employment. The increased number of placings resulted in a record total of appointment fees. It is pleasing also to note that more than 10 per cent of the men placed were over fifty years of age. Vacancies overseas were about one-third of the total notified, most of them being in "eastern" countries. The income from fees charged, although larger than before, nevertheless did not balance the expenses. Donations by employers, more than double those made in the previous year, enabled the Bureau to meet its liabilities.

SCOPE FOR INQUIRY

The discovery of a serious redundancy of meter readers in the London Area is likely to lead people to wonder whether this is a special instance or whether there are superfluous employees in other branches of the electricity supply industry. It was expected that nationalization would result in labour economies but the numbers employed have since increased substantially. It is fair to say that the B.E.A., in its last report, justified larger staffs by pointing to the great expansion of its work and that of the Electricity Boards since vesting day. Nevertheless, the London case suggests that there may be scope for investigations in other directions to make sure that manpower is not being wasted.

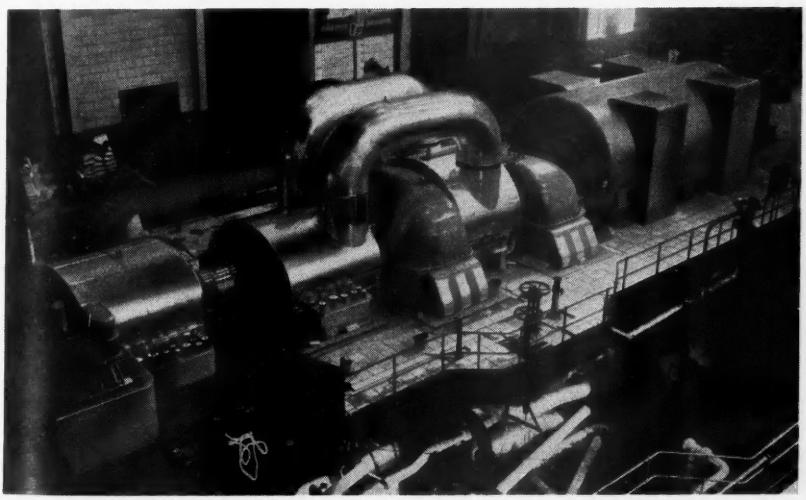
AUSTRALIAN RESTRICTIONS

This country's export trade will be seriously hit by the decision of the Australian Government to curtail imports—by something like half in the case of Great Britain. The blow will fall most heavily on the textile and automobile industries. What its effect upon the electrical industry will be is not yet clear. It seems, however, that licences will still be granted for the importation of the heavier equipment although "consumer" goods will come under the ban. Complete particulars are not yet available, but in announcing the restrictions, the Prime Minister (Mr. Menzies) referred to cuts in imports of refrigerators, fans, floor polishers, washing machines and radio apparatus. In 1951 we exported electrical goods and apparatus to the value of nearly £11 million to Australia. Exports of electrical machinery and other plant were valued at about £8 million.

Operational Methods at the Now Completed Power Station

THE inauguration last week by the Mayor of Fulham, Councillor P. E. Fenne, J.P., of another 60 MW turbo-alternator at the Fulham power station of the London Division of the British Electricity Authority marks the completion of the generating plant in this station. This affords a good opportunity to describe the station operationally, partly because of its somewhat unusual history, which dates back to 1936 when it was first commissioned with two 60 MW turbo-alternators. Additional 60 MW sets were commissioned in 1937, 1941 and 1946; the last one thus brings the capacity up to 360 MW. The station was designed for

The low-pressure turbine cylinder of the new turbo-alternator at Fulham power station is of double flow design, and the alternator is hydrogen cooled



Coal is unloaded from 2,000-ton B.E.A. colliers by jetty cranes with 4-ton grabs

base load requirements and has been operated all along in this way.

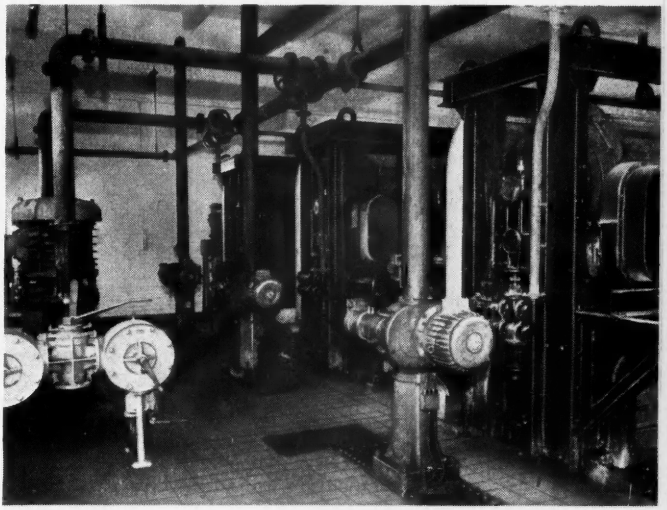
In 1940, when the station capacity was still only 180 MW, although the fourth set was nearing completion, the station suffered very severely from enemy action. The turbine house was directly hit by a high explosive bomb, which landed between two sets then in operation and put the station completely out of action for a couple of months.

No. 1 set was very severely damaged and the other two sets were affected to lesser degrees. By extraordinary efforts on the part of the station staff and the plant manufacturers No. 3 set was put into operation after only two months' delay, No. 2 set was recommissioned after about three months, and No. 1 set was back in operation again in about a year. No. 4 set was also in operation by this time, giving a total capacity of 240 MW.

In addition to the damage to the turbo-alternators the circulating water system was pierced, so that the turbine house was flooded to tide level, the turbine lubricating oil system was ruptured and the turbine house was seriously damaged, the roof having to be completely reconstructed.

The station still follows the original design, with certain modifications consequent on technical advances, and the initial steaming conditions of 600 lb/sq in and 800 deg F remain. The thermal

The coal handling system carries the coal from the jetty either direct to the boiler bunkers or to the storage silos, one of which is spanned by a transporter bridge



Circulating water is taken from the Thames through two screen houses; the new house showing screens on right, manstocks and spray jets on the left

efficiency of the station as a whole has averaged 26·66 per cent over the past few years.

The station is on the north-west bank of the Thames, almost at the foot of Wandsworth Bridge down stream, the river running north-east to south-west at this point. The site area of about 12·5 acres is almost rectangular with about 1,300ft of river frontage at the south-east, and Townmead Road as its boundary on the north-west.

The principal buildings occupy roughly a third of the site at the north-east end, the turbine house (320ft long and 105ft wide) in the north site corner running parallel with the river, and the two adjacent boiler houses, measuring overall about 250ft by 300ft, running normally to, and between, both the turbine house and the river. The basement and operating floor levels of the turbine house correspond with the basement and firing aisle levels of the boiler houses, respectively, the operating floor and firing aisle levels being the actual ground level.

About half the site at the south-west end is devoted to coal storage, there being three "open" silos with a total capacity of 88,000 tons. This storage is fronted on the river side by a reinforced concrete coaling jetty 350ft long. Between the turbine house and the boiler houses is a feed pump bay containing all the feed pumps at ground level; the de-aerators, evaporators and steam receivers at the next higher level; above this the condensate surge tanks; then the station auxiliary 6·6 kV switchgear; and at the highest level further service water storage tanks. On the south-west side of the turbine house, i.e., between the turbine house and the coal storage, is a separate block of six 66 kV switch houses.

The six turbo-alternator sets are arranged crosswise in, and spaced uniformly throughout the length of the turbine house at 48ft centres. The first five turbo-alternator sets were produced and installed by the Metropolitan-Vickers Electrical Co., Ltd., and the latest set by the English Electric Co., Ltd. In each of the two boiler houses there are eight boilers, four on each side of the firing aisle. All of them are Stirling tri-drum boilers, the first eight each having an output of 260,000 lb/hour, and the second eight 315,000 lb/hour.

Northumberland and South Wales coals are mainly consumed in the station, and they are directly water-borne from the Tyneside ports and from Barry to the station jetty in 2,000 ton B.E.A. colliers. Two ships can be berthed at the jetty for simultaneous unloading by three Cowans Sheldon electric cranes with four-ton grabs. Coal from the grabs is fed to weigh hoppers spaced along the jetty which serve two belt conveyor lines running from end to end of the jetty. This coal handling scheme is so extended, mainly by duplicate belt conveyors in overhead gantries and bucket elevators, that coal can be taken direct from the jetty to the boiler house bunkers or to the coal storage ground. Reserve stocks of Welsh coal are built up in three silos which constitute the storage ground, and the largest silo has a drag scraper system for

distributing and reclaiming the coal. A second silo is spanned by a transporter bridge which does similar work. The coal handling plant was installed by the Mitchell Engineering Co., Ltd.

Each pair of boilers is served by a double outlet steel coal bunker holding 800 tons. From the bunkers the coal is gravity fed to the Taylor retort stokers with which all the boilers are equipped. There are 18 rams in the stoker of each boiler in No. 1 boiler house and 19 rams in the stoker of each boiler in No. 2 boiler house, and they deliver coal to the combustion chamber at the rate of about 14 tons/hour. The grate area of each of the smaller boilers is about 700 sq ft, and of each of the larger boilers about 750 sq ft.

The drive for each stoker constitutes an oil hydraulic transmission system which is operated from a variable stroke motor driven oil pump. The stroke of the pumps and therefore of the oil motor or hydraulic transmission, and in turn the speed of the stoker shaft, are under infinitely variable speed control from the boiler control board in each case on the firing aisle.

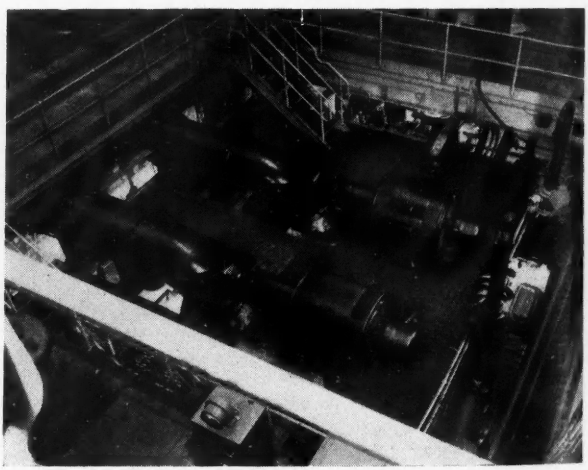
The clinker and ash pass over the back of each stoker grate and through crushers into an ash hopper beneath. Periodically the crushed material is discharged from the hopper by high pressure water jets and passed into the troughs of the Hydrojet ash handling plant in the boiler house basement. By means of other water jets the ash is carried along the trough to an ash pit at the river end of the basement.

An electric telpher crane with its crab at ceiling level in the basement, carries the ash from the pit to a skip hoist which elevates it to one of the shuttle conveyors mounted above concrete ash bunkers immediately outside the boiler house at the river front. There are two identical ash handling plants of this description, one for each boiler house, and in all there are six bunkers for the two boiler houses, with a total capacity of about 200 tons. The ash from the bunkers is hopper fed to road lorries underneath for final disposal.

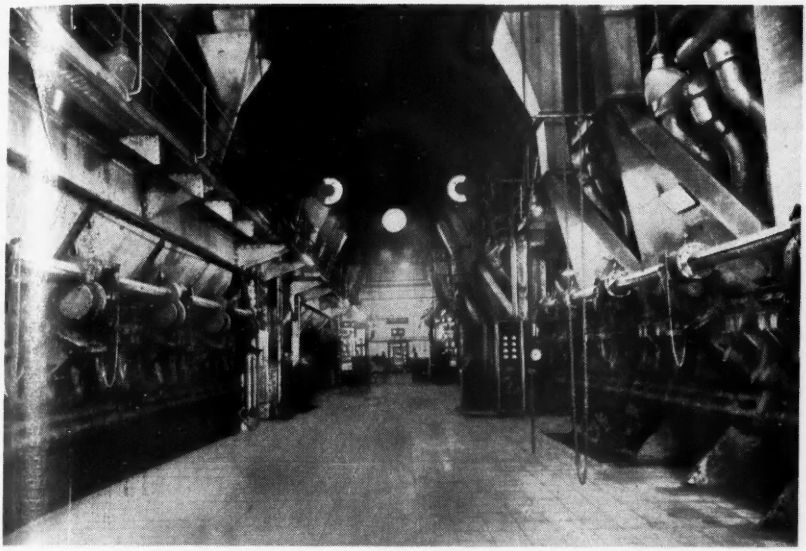
For extracting the dust and grit from the rear of the boiler and economizer, there is a B.V.C. vacuum dust removal plant which delivers the material to hoppers near the ash hoppers. The bulk of the grit removed in this way, however, is injected by compressed air into the rear of the boiler furnace for refiring.

We have already explained that in three of the latest boilers there is an additional air heater on the cold side of the Howden preheater, thus in sequence order the following are the major components comprising the air circuit in each of these three boilers: forced-draught fan, tubular air heater (B & W), air preheater (Howden-Ljungstrom), plenum chamber under the stoker grate, coal bed, combustion chamber, boiler tube system, economizer tube system, Howden air preheater (return), grit arrestor, tubular air heater, induced-draught fan, duct and chimney. The corresponding circuit in all the other boilers is: f.d. fan, Howden air preheater, plenum chamber, coal bed, combustion chamber, boiler tube system, economizer tube system, air-preheater, grit arrestor, i.d. fan, duct and chimney.

The intake air is taken from the top of the boiler house, and the f.d. and i.d. fans, air



There is a pair of axial flow c.w. pumps below river level for each turbo-alternator set



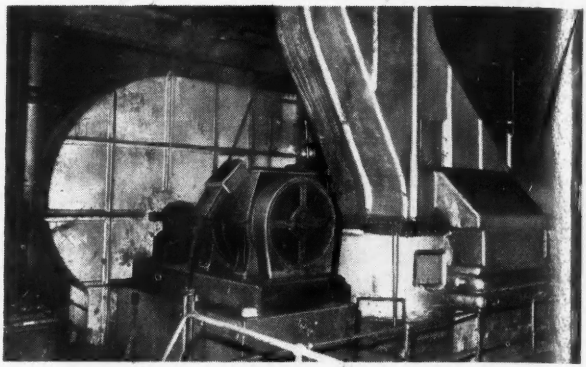
Each boiler house has two rows of facing boilers in the the firing aisle

heaters and grit arrestors are all at the upper levels of the boiler house structures. A secondary air scheme with its fan in the boiler basement is really a by-pass to each of the main circuits outlined above, as its inlet is from the main air trunking from the air preheater and its outlet is into the combustion chamber above the stoker. All the f.d. and i.d. fans are of Howden make. The air quantities are regulated by electrically controlled hydraulic couplings in some instances, and in other cases by two-speed driving motors plus the Tate system of fan vane control. The secondary air fans are all by the same makers and are driven by constant speed motors; the air regulation is in all cases by vane control, in most of the boilers on the Tate system and in the others on the Lockheed system.

All the grit arrestors, two per boiler, are Howden "Centicell" equipments. The grit is gravity fed into a system of Redler conveyors which delivers it into bunkers aligned with the ash disposal plant outside

From the ash pit a telpher crane at basement ceiling level removes the ashes and deposits them in the skip of the ash handling plant

the boiler house at the river front. A B.V.C. mixer unit at the outlet of each bunker has very greatly improved atmospheric conditions at this point. In the mixer are two sets of revolving paddles, the blades of which interweave during their rotation when the grit stream is passing through the mixer. During this time prescribed quantities of water are fed into the mixer, and the result is a material of the consistency of damp sand which is discharged from the mixer into lorries.

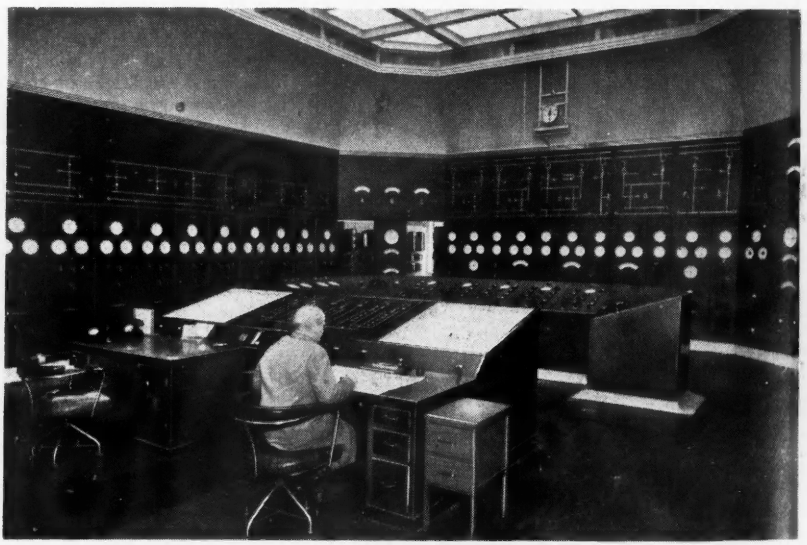


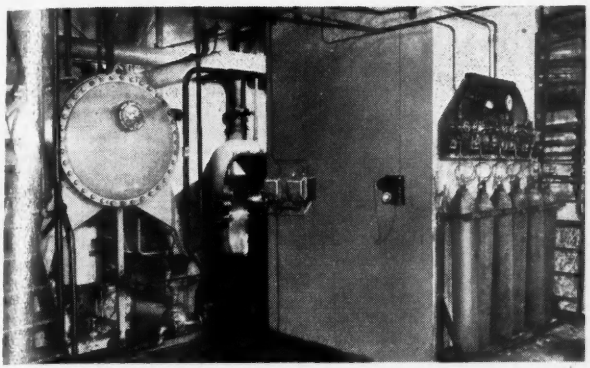
In each case the f.d. fan passes the air on to an air preheater

With steaming conditions of 625 lb/sq in and 850 deg F in all cases the boilers each have their superheater centrally disposed between the front and back nests of circulating tubes, and the economizers immediately at the back of the rear steam drum to mud drum tubes. Boilers 1 to 6 have Green's economizers, and all the others have Senior economizers. In each case there is a Howden-Ljungstrom air preheater over the economizer and just above the steam drum level. In three of the latest boilers there is an additional Babcock and Wilcox tubular air heater on the cold side of the Howden preheater.

The heating areas of the larger boilers are as follows: economizer 13,500 sq ft; boiler system 25,450 sq ft; and super-

In the control room the alternators are provided with sectional desk type control panels in front of their respective instrument panels and facing the control engineer's desk





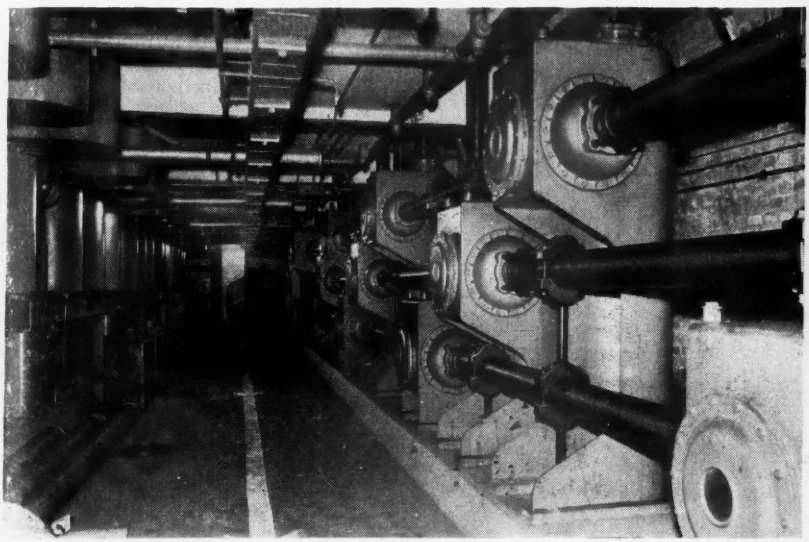
The sealing oil for retaining the hydrogen at the alternator bearings is maintained by a gland seal oil unit (left); distilled water circulating pump centre rear, hydrogen make-up cylinders right

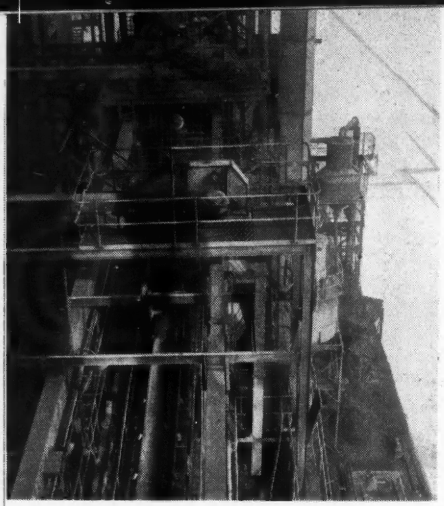
heater 10,800 sq ft. All the boilers are provided with superheat control of the contact type, the control being effected by by-passes between the first and second stages of the superheater. On eleven of the boilers the James Gordon Hagan pneumatic control scheme is employed, while on the other five the George Kent electrical scheme is used. Both schemes base their control on a thermostat inserted in the main steam outlet pipe.

From the superheater the steam passes to any of six receivers and thence to a separator and the turbine stop valve. The receivers are all interconnected by a series of crossover pipes and the three latest turbines have, in addition, cross connections on the outlet sides of the receivers, the supply to each set being provided by two receivers.

All the Metrovick turbo-alternators run at 1,500 r.p.m. The h.p. cylinder of each of the three older turbines comprises a velocity-compounded stage, followed by twenty-one single impulse stages. In the Nos. 4 and 5 machines the velocity-compounded stage is replaced by seven impulse stages. In the l.p. cylinder of all five of these turbines there are thirteen

The 66 kV switchgear is of 1,500 MVA rupturing capacity and has bushing type connections; busbar chamber below circuit breakers





From the ash pit the ashes are skip fed to shuttle conveyors above the ash plant bunkers; grit conveyors and vacuum dust plant also shown

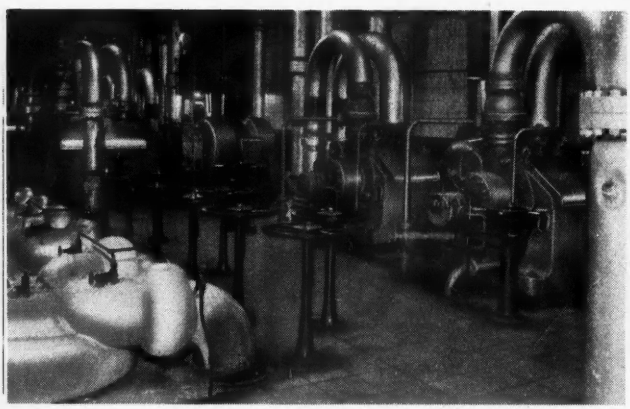
impulse stages followed by a duplex multi-exhaust. Each of these turbines exhausts into a Vickers-Armstrong regenerative condenser arranged in two halves, each served by a separate circulating pump, enabling half load to be obtained while one half of the condenser is being cleaned.

While of the same ultimate rating as the other turbo-alternators, the new English Electric set, which runs at 3,000 r.p.m., is designed for final steam conditions of 900 lb/sq in and 900 deg F. It is a three-cylinder turbine, the existing conditions being provided for by omitting four stages from the h.p. cylinder, thereby reducing the rating to 52 MW. The h.p. cylinder has seventeen impulse stages (thirteen initially), the i.p. cylinder has fourteen impulse stages, and the double-flow l.p. cylinder one impulse and seven reaction stages in each flow. The turbine exhausts into two separate condensers which have a total cooling area of 75,000 sq ft in a design to maintain a vacuum of 29in when using cooling water at a temperature of 60 deg F.

From the condenser, and in the order given, the following components complete the heat cycle (with one exception, the gland heater is omitted from the cycle of the latest turbine): extraction pumps, air ejectors, l.p. feed heaters, gland heater, de-aerator, de-aerator storage tank, l.p. feed water (lift) pumps, Nos. 3, 4 and 5 h.p. feed heaters, l.p. header, h.p. pump, h.p. feed headers (duplicate), boiler house ring main feed headers, economizer, boiler, turbine, condenser. The two l.p. feed pumps and the h.p. feed pump associated with the new set are designed for the ultimate conditions of 1,265 lb/sq in and 385 deg F, the initial conditions being met by the omission of three stages from each of the l.p. pumps and four stages from the h.p. pump.

The feed heaters and the de-aerators are served with steam bled from the later turbine stages. Make-up water for the cycle is taken from the town supply and is introduced at the l.p. heater, after being treated in the unit evaporator system. Each evaporator set incorporates first and second effect evaporators capable of providing 19,920 and 17,080 lb/hr of condensate, respectively. The effects are supplied with steam bled from the l.p. turbine cylinder, the total capacity of both the evaporator effects being 37,000 lb/hr.

Condenser cooling water is drawn from the river through two screen houses equipped with six 6ft Brackett band screens in one case



In the heat cycle the l.p. feed (lift) pumps (right) deliver to Nos. 3, 4 and 5 h.p. heaters in series (left front) and thence to the h.p. feed pump (rear)

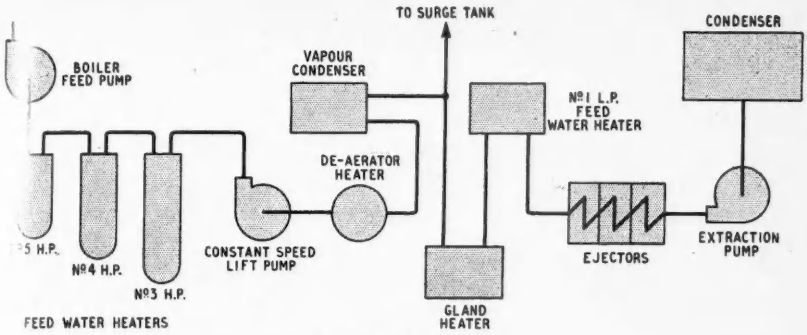


Diagram of feed flow system

and four double 4ft screens of the same make in a new house. Immediately outside the screen houses is a penstock chamber by which the water is controlled to flow through two brick-lined tunnels which extend to a distribution chamber on the north-west side of the turbine house. Branch tunnels from this distribution chamber connect with vertical surge shafts from which the c.w. pumps draw their supplies. The levels of the tunnels are such that the pumps are flooded at all tides. Each of the condensers of Nos. 1 to 5 sets is served by two Vickers axial flow pumps situated in the basement of the c.w. pump bay alongside the distribution chamber.

Two centrifugal Mather & Platt pumps, each capable of delivering 27,000 g.p.m., serve the latest generating set, and they are similarly connected. To allow for temperature differences in the river water over the year pump speed variation to the extent of about 100 r.p.m. is provided for by the s.r. driving motors. The discharge water from the condensers of Nos. 1 to 5 sets is returned to the river through separate pipes leading to a single tunnel along the north-east side of the major buildings and terminating at

At 48ft centres the turbo-alternator sets are disposed crosswise throughout the length of the turbine house

the river outlet chamber. For the new set there is a 54in diameter steel pipe all the way to the river outlet chamber.

All the alternators generate at 11 kV, and each is electrically tied to a 75,000 kVA Metrovick 11 kV/66 kV generator transformer. These delta-star connected oil immersed forced oil circulation (with water cooling) transformers are individually housed in soundproof buildings along the north-west side of the turbine house.

The alternators of Nos. 1 to 5 sets are air cooled on the closed principle with water cooling of the air; No. 6 is hydrogen cooled. In this new set the stator is enclosed in a mild steel explosion-proof casing and hydrogen gas is circulated through the stator and rotor windings by means of fan blades attached to the rotor shaft. Water coolers are situated inside the outer casing, forming part of the gas circuits, and by means of baffles immediately outside the stator the gas is split up into streams in different directions in alternate sections of the winding in such a way that every part of the windings receives its due share of cooling gas. Hydrogen is also directed from end to end through the rotor windings.

The water side of the gas coolers is a closed system with distilled circulating water which is itself cooled in a heat exchanger by river water taken from the c.w. system. The hydrogen is retained at the bearings by oil sealed glands, the sealing oil being supplied by a gland seal oil unit which includes main and emergency oil pumps, a vacuum pump and a separating tank for removing entrained hydrogen gas. The required volume and pressure of gas is maintained in the system by means of "make up" from gas cylinders suitably housed in the basement under the alternator.

The electrical control of the alternators is effected on the 66 kV side of the generator transformer by means of Metropolitan-Vickers oil immersed metalclad duplicate busbar 1,500 MVA rupturing capacity switchgear with bushing connections throughout. In each of six switch houses are a generator transformer, a section reactor and a number of feeder circuit breakers with double breaks and cross jet explosion pots.

Situated between the 66 kV switch houses and the turbine house is a spacious and well laid out control room with the main panels forming three sides of a square. Above these main panels is a mimic diagram of the 66 kV system associated with the station, with circuit breaker indicating lamps. Centrally disposed are the control engineer's desk and a desk type mimic diagram.

For house supplies there are three 15,000 kVA 66/6·6 kV transformers which are supplied independently of the power station plant. These house transformers are connected to 6·6 kV Reyrolle oil immersed metalclad switchboards from which the feed pump motors are supplied direct, these auxiliaries being the only ones operated at this higher voltage. All the other auxiliary drives are operated at 400 V with supplies from various distribution boards which, in turn, are supplied by transformers all initially connected to the 6·6 kV station switchgear.

Inauguration Ceremony

When inviting the Mayor of Fulham (Councillor P. E. Fenne, J.P.) to commission the new set, Mr. H. V. Pugh, controller, London Division, B.E.A., welcomed him and members of the Borough Council in particular as representing the former owners of the station.

The Mayor voiced his pride in his part in the function because he had at one time worked at the power station and later had been a member of the Fulham Electricity Committee up to the time of nationalization.

Mr. W. C. Parker, controller, South Eastern Division, B.E.A., and formerly borough electrical engineer of Fulham, said that he felt that he was on home ground. He still kept an eye on the published efficiency figures of the station, and he was proud of the high place it was maintaining.

Sir John Hacking, deputy-chairman (operation), B.E.A., looked back to the inception of the station which rested with the former Central Electricity Board and paid a high tribute to Mr. Parker who had supervised the construction and the operation of the station and had shown remarkable resource in getting the plant into operation again after the worst enemy action incident to which the electricity supply industry had been subjected.

The station had held the highest place in thermal efficiency for two years—1947 and 1948. There would always be a Fulham station because of the excellent site facilities, and in view of this and the advanced steaming conditions of the new set the B.E.A. felt it could visualize this last set of the existing station as the first set of a new Fulham station.

Mr. J. G. Broughton, station superintendent, said the high plant availability and efficiency figures at Fulham were due to the excellent team spirit which prevailed.

Nationalized Inertia

Complaints and Suggestions

A LEADER in the *Electrical Review*, just before the General Election, stated that denationalization of the electricity supply industry was undesirable, that industry having been previously subject to considerable Governmental regulation, so that the transition to national ownership was carried out smoothly and without upheaval. The same could, of course, be said of the nationalized gas industry, the railways and the coal mines, although the last are in a rather special position.

Now, whilst one may or may not agree with nationalization in principle, there can be no doubt about some of its evil effects, not the least of which is the state of very slow motion which seems to afflict nationalized concerns. This slowness to decide anything seems to spring from two main points, or perhaps two aspects of the same point: namely, that engineers appear to be no longer in a position to decide matters on their own responsibility; and that everything that comes up is handled by committees.

We think that the views aired by the writer, a prominent electrical man, who remains anonymous to give him greater freedom of expression, will have a mixed reception from readers. We invite both those who agree and those who differ to express their opinions in these columns.

I am speaking from the angle of a concern selling or trying to sell equipment to the various Area Electricity Boards. In my experience, decisions to buy or not to buy which used to be made on the spot (in fact an order might even be made out while one waited) now take anything from six months to two years. I am considering here the many items in almost everyday demand as distinct from heavy engineering products. Even in cases where a Sub-Area engineer knows exactly what he wants and dictates the requisition to his secretary on the spot, the order may take a month to arrive. Officials who require apparatus are completely divorced from those who have to order it and one can only assume that requisitions are mere "bits of paper" in some headquarters clerk's "IN" basket.

These delays arise from various causes. For example, the engineer responsible has to *persuade* his assistants that, in his opinion, a particular piece of equipment is necessary; he apparently is not in a position to *decide* as he used to be, and this process takes time. On the other hand, it may have been decided to standardize certain equipment throughout an Area and once this decision has been made, everyone in the various Sub-Areas naturally goes slow pending the appearance of new designs. These may literally take years to produce because of attempts to include every possible good feature, and to get agreement among the various committee members, each of whom may have to contend with different conditions.

A further source of delay is the carrying out of tests to prove some particular point, whereas in many cases all the relevant information is already in existence in the files of the various testing departments. One also finds committee meetings postponed for a month at a time because it is discovered that some of the members are on holiday or because one committee meeting accidentally clashes with another.

So it goes on, until one comes to believe that to the Electricity Boards time is of no importance and costs nothing. In fact, this disease seems to have become widespread amongst engineering firms generally; the bigger the concern, the more noticeable it is. Delivery? "Yes sir! Twenty-six to forty weeks." Or, maybe, "Eighteen months," without stopping even to inquire. A telegram used to bring a wire by return, but not now. Nobody bothers and one is lucky to get a letter next week. Long delivery is so usual, often because materials become scarce while the Boards try to decide what they want, that some Area Boards even have printed on their orders a note to the effect that delivery shall be

completed within six months; as though such a period were not utterly unreasonable for a large proportion of their purchases.

Again, perhaps some steel is required, so being duly furnished with the appropriate forms you approach various stockholders who, not having supplied you before with the particular material required, as your manufactures did not need it previously, regret that they cannot supply as they naturally must satisfy their regular customers. You then proceed for help to the local office of the Ministry of Supply and are told that " Forms don't make steel " and in any case, you have no business to secure an order for which you have no steel in stock! It is at this point that the black market is so helpful.

Transport Troubles

We will now assume that notwithstanding everything, some of your products are ready for despatch. They have been manufactured in a certain large town in Lancashire and have to be delivered to somewhere in Yorkshire. You ring up British Road Services explaining what you want and, with luck, your products will be collected within a week; and when your customer rings you up ten days later inquiring what has happened to them, you learn that they are being delivered via London. You complain and British Road Services say you should have sent them by what used to be Fisher-Renwick, or some other way, as if this decision were not part of their business. So next time you do this, but do they call as arranged? Oh, no! You ring up—" Yes. You are on the list—very sorry the driver forgot to call "; and, as the alternative service runs only once a week, another week goes by. Time is no longer of any interest.

Now let us consider British Railways from the mere traveller's point of view; you don't send your goods that way, if you can help it. You have only to suggest doing so to your customer and, be he national Board or private purchaser, his immediate reaction is " For Heaven's sake, don't send them that way. Heaven only knows when we'll get them if you do."

To revert to our traveller: he has an appointment for a certain time at Liverpool for example. He catches his train in Manchester and when he should be in Liverpool he is in Warrington—train delayed due to goods wagon off the line; so he returns to Manchester—a wasted day. The point is that the railway authorities knew all about it, but just let people go without a word which would have enabled them to go by an alternative route. Again he waits half-an-hour in his slow train from Manchester because an express that should have gone ten minutes before his has not turned up. Apparently, no one knows where it is and cannot even find out, but after half-an-hour someone decides that the express is not coming just then and the let the slow train go, and so it goes on.

In considering these few typical faults of the various nationalized industries, the question is, can anything be done about it? As a staunch supporter of the recent administration said to me, " It's the human element that has let us down." One wonders did they legislate for angels or what? Something could be done about it, and with due deference, one makes the following suggestions.

Departmental Responsibility

Electricity Supply Industry.—Abolish or drastically reduce the number of committees. Give increased authority to heads of departments. All ordering and the chasing of orders to be done in the building from which the requirement originates.

British Road Services.—Apart from reorganization which, one understands, the Government has in mind, one would suggest the appointment of intelligent, experienced male clerks to handle all inquiries, especially on the telephone. (One would not then be asked by a small girl how big a two ton article would be as her section only handled small parcels.) An improved system of ensuring that drivers do not forget to call. One cannot make any suggestion as to how to prevent deliveries from Lancashire to Yorkshire being made via London.

British Railways.—All workers from the highest officials downwards should travel to and from their work by train. Senior officials concerned with railway service should live near important rail centres and be spread throughout the system as a condition of employment. This would be salutary in improving services as it is noteworthy that the service to places where high officials live is usually better and more punctual than to other places. Officials should be instructed periodically

to take particular trains and find out where they can get to (or not get to) in a particular day. This would reveal many anomalies and enable much improvement in connections and timing to be made.

All large organizations are slow moving and the bigger they are, the more slowly they move, so it may be that some decentralization of authority throughout the boards of all nationalized industries would help materially to speed up the handling of matters with which they have to deal.

There can be no doubt that the inertia that has descended upon the various nationalized industries since their vesting days has produced a similar slowing down and a widespread feeling of frustration in industry generally, so it is sincerely to be hoped that those concerned will do something about it soon.

RESEARCH REPORTS

Recent E.R.A. Publications

AMONG the publications recently made available by the British Electrical and Allied Industries Research Association, Thorncroft Manor, Dorking Road, Leatherhead, Surrey, is Report Ref. B/T111, "Review of Problems of H.V. D.C. Transmission and Future Possibilities" (7s 6d). This briefly reviews early work, the present position, and future possibilities of power transmission using d.c. at high voltages. It is based on careful study by this E.R.A. section of the information available on the subject, and it is believed to represent the best informed opinion at the present time, though modifications may naturally be expected with the growth of experience.

Report Ref. G/T255, "Gas-Blast Circuit Breakers. Further Study of the Effect of Arcing on the Mass-Flow of Air through the Nozzle and on the Nozzle Pressure" (10s), by A. A. Hudson, B.Sc., Wh.Sch., is a progress report on the study of air flow in circuit breakers, carrying the work reported in Ref. G/T234 a stage further. It discusses the principles underlying the effect of the presence of an arc on the pressure and flow in a nozzle. Further experimental results on mean mass-flow through, and pressure developed in, a nozzle under varying conditions of diameter and current are given and certain conclusions are drawn therefrom.

In Ref. L/T224 the properties of single domains of barium titanate were discussed in a phenomenological way. In Report Ref. L/T265, "Theory of Barium Titanate, Part 2" (10s), by A. F. Devonshire, the theory has been extended and expressions have been obtained for the piezo-electric constants, elastic coefficients for constant field, and dielectric constants for constant strain in terms of other physical constants of the material.

The construction and performance of a pulse generator based on a design developed by the U.S. Army Signal Corps Laboratories is described in an advance summary of Report Ref. M/T113, "A Pulse Generator Producing 0·01 μsec Pulses" (7s 6d), by S. F. Pearce and D. C. G. Smith. The pulse, produced by a gas tetrode, has a duration of approximately 0·01 μsec and may be repeated at rates between 0·3 and 10,000 pulses per sec. It provides a valuable tool for the testing and checking of interference-measuring sets, particularly of the C.I.S.P.R. type, in the frequency range 0·15 Mc/s to 30 Mc/s. The performance of the circuit is analysed in some detail and the features limiting the frequency range covered are clarified.

Report Ref. V/T109, "The Incidence and Avoidance of High Resistance Joints in Steel Conduit Runs in Service" (12s), by L. Gosland, B.Sc., M.I.E.E., and E. E. Hutchings, B.Sc.(Eng.), A.M.I.E.E., contains a survey of results obtained on practical installations and analyses measurements of the resistance of laboratory runs over periods of up to six years, both indoors and outside. The effect of the application of various protective materials to joints is also studied. Recommendations are made in the report for improving the performance of conduit joints and for specifying the permissible resistance and its method of measurement.

Power Farming

Use of Electricity on the Small Farm

SPECIAL attention to the interests of the farmer who works 300 acres or less is a feature of the National Power Farming Conference which, organized by the *Power Farmer*, is being held at Harrogate this week. In a paper presented on Wednesday Mr. C. A. Cameron-Brown, agricultural electrification adviser to the British Electricity Authority, points out that the farmer in this class will be much more personally aware of the advantages of mechanization than the large farmer whose activities are probably entirely those of management.

Full and most advantageous mechanization of the buildings depends on electricity. Since the war the supply of electricity, greatly expanded though it has been, has radically lagged behind demand, but an astonishingly large number of farmers having supplies make but a feeble attempt to use it to their own advantage.

While the proportion of farms supplied with electricity is not so high in this country as in some others, we have made as intensive a study of farm electrification as any other country and have developed a degree of farm electrification and novelty of application not exceeded anywhere and rarely equalled. Some of our electrical developments are not matched anywhere.

Value of Good Lighting

Quite inadequate use is, however, made of electric lighting on British farms, only too often on the basis of simply replacing the hurricane lamp, despite the fact that generally the cost of lighting is negligible. Farmers tend to overlook the fact that adequate lighting, while not perhaps saving labour, can contribute much to better labour utilization. Effective lighting of the workshop and repair shed can double the efficiency of after-dark working.

The need for effective lighting in cowshed and dairy is better realized—there cannot be cleanliness where dirt cannot be seen. Properly planned artificial lighting will often afford better visibility than daylight. Fluorescent lighting was never intended for the operating conditions found on the farm; more adequate lighting can be installed for very much less in capital outlay.

In milk production the 10 gall washboiler is probably more highly appreciated by the " under-10-gallons-per-day " man than the large storage water heater by the big producer. " On tap " hot water is probably the greatest single contribution to both personal and utensil cleanliness.

Steam Sterilizing

Great Britain is ahead of all other countries in developments in sterilization by the steaming method, more particularly in the way of storage steam raising by the water storage system and hot-block. For the " small man " there is a choice of simple, self-contained, washing-cum-sterilizing equipments which give effective service.

While the present unsatisfactory criterion of " cooling " holds (5 deg F over water temperature) there cannot be the same call for refrigerated cooling that would otherwise exist, but there is a call and the smaller producer would seem to be best served by either the chilled-water-circulation or churn-immersion methods.

The smaller farmer can most readily appreciate the benefit of power hoisting and transporting but he does not always perceive how the electric motor lends itself to these services. The advantages offered by automatic grinding have been widely accepted. Mixers, too, are of direct value to the farmer. For the smaller farms grain drying will mainly be attractive in either the " in-bin " or " platform " dryer forms.

Swedish Power Consumption

THE *Anglo-Swedish Review* quotes Mr. Folke Petri, of the Swedish State Power Board, as saying that in 1951 the consumption of electricity in Sweden was 19,350 million kWh, as compared with 9,000 million kWh in 1941. About 65 per cent of the consumption is accounted for by industry. In addition to home consumption Sweden exported 150 million kWh to Denmark last year.

Ideal Home Exhibition

A Survey of Electrical Appliances on View

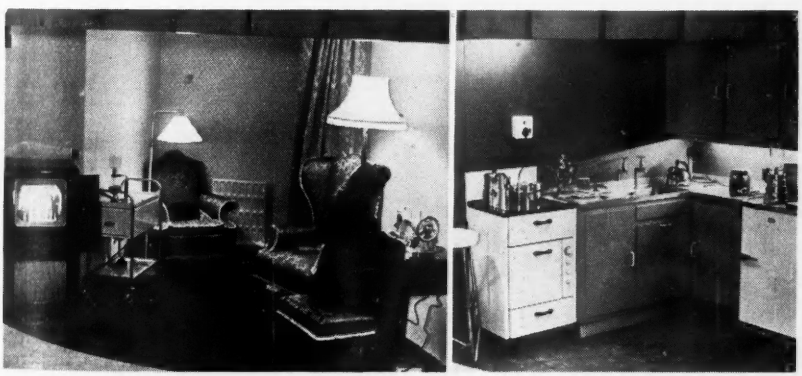
WHILE the *Daily Mail* Ideal Home Exhibition at Olympia nowadays provides the best opportunity of the year for seeing domestic electrical appliances, there are rather fewer electrical exhibits on view this year. Principally because of the shortage of materials, not only are some leading manufacturers not participating in the exhibition on this occasion but fewer new products have made their appearance. In many cases, too, particularly in respect of such items as refrigerators and washing machines, delivery dates have receded considerably. Some of the smaller electrical appliances are still fairly readily available and recently the position regarding cookers has become much easier.

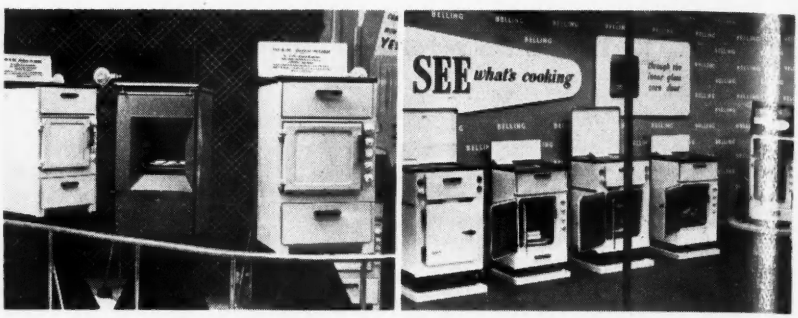
In the model houses, which always constitute one of the principal centres of attraction, electrical labour-saving appliances are well to the fore and an encouraging feature is the greater attention that has been paid to achieving effective and decorative illumination. In the row of shops, which together with the houses form a model village, Hoover, Ltd., and Morphy-Richards, Ltd., have taken premises to display their wares, the latter company introducing a new flex support and also a new lightweight iron, the "Atlantic," specially designed for the American continent but soon to be available in the United Kingdom. In another shop the Radio & Television Retailers' Association has prepared a comprehensive display of radio and television receivers and accessories.

Another special feature of this year's exhibition is the large number of exhibits, largely electrically operated, indicating the methods adopted in producing various commodities. These include two separate displays showing how bread is made by Hovis, Ltd., and Procea Products, Ltd., two demonstrating the manufacture of cigarettes by W. D. & H. O. Wills and J. Wix & Sons, Ltd., and another by the Nestlé Co., Ltd., showing how "Nescafé" is produced.

"Electricity Makes Life Easier" is the theme of the Electrical Development Association and to prove the truth of this claim visitors are invited to sit down and rest their "exhibition feet" for ten minutes or so while the E.D.A. exhibit is presented to them.

Two of the five scenes in the E.D.A. "Electricity Makes Life Easier" display at the Ideal Home Exhibition: "Evening in the Lounge" and "Breakfast and Getting Husband Away to Work"



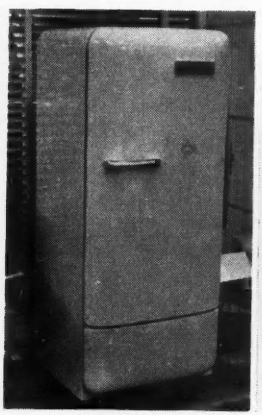


The Jackson glass-backed demonstration cookers enable the cooking process to be studied. On the right is shown a range of Belling cookers

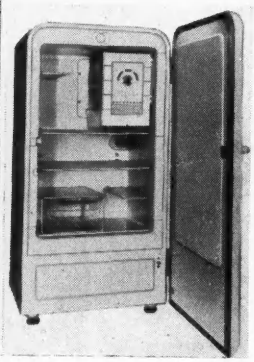
This is done by means of an electrically operated revolving stage 20ft in diameter on which actors and actresses portray five cameos of the routine home life of " Mr. and Mrs. Everyman," showing how " electricity makes life easier " for them. Each of the five scenes is preceded by a recording of what happens in the non-electric house. The curtain then rises and the same position in a modern house, equipped with electrical appliances, is enacted by a stage husband and wife. The five scenes depict " Getting Up," " Breakfast and Getting Husband Away to Work," " Putting the House in Order," " Evening in the Lounge," and " Week-End in the Garden," and each setting incorporates the appropriate electrical appliances. People passing by the stand also see the same scenes through television-screen-shaped windows.

In another section of the E.D.A. stand are seen the Santon " Hotsprings " portable electric shower bath in operation and a Jackson oven with a glass back to show cooking actually in progress. Some comparatively unknown uses of electricity are also demonstrated and things that " only electricity can do " are typified by electrically heated shoe drying trees, an electric tea cosy and an electric door alarm. A particularly useful item is a panel which directs visitors to forty of the more outstanding electrical exhibits elsewhere in the exhibition.

Besides exhibiting cookers, washing machines, food mixers and platewarmers, the English Electric Co., Ltd., shows for the first time at this exhibition its 76A (7·6 cu ft) refrigerator, a " phantom " model indicating special features. New refrigerators are also to be found on a number of other stands. A 6·5 cu ft model, with a sealed, noiseless, operating unit appears on the H.M.V. stand, accompanied by a 21in tube direct vision television receiver and a representative selection of fires, toasters, warming plates, radio sets, etc.

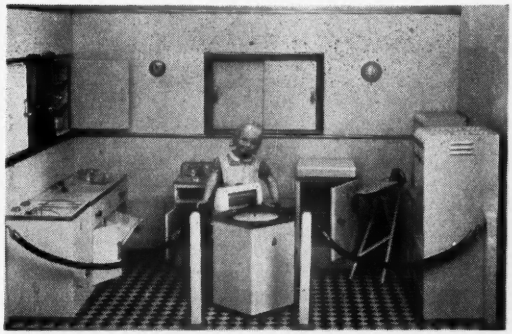


The new H.M.V. 6.5 cu ft refrigerator (left) and " Prestcold " 5.1 cu ft model



Another new refrigerator is the " Prestcold " L.51 (5·1 cu ft) unit which incorporates a frozen food locker with a storage capacity for 13 lb of packaged frozen food, a fold-down top shelf, an ice-maker for 1¼ lb of ice per freezing, automatic interior light, ten-point temperature control, transparent

Miniature scale model kitchen shown by H. Fisher (Oldham), Ltd.



" Cri ator " drawer for salads, etc., d adjustable levelling feet.

A ng other " Prestcold " equi ent displayed are 7 cu ft and 1 cu ft domestic refrigerat and the recently introduce OFC.351 frozen food cabi t (350 lb capacity), ice crea conservators and a 15·4 cu f ervice cabinet.

W h Frigidaire domestic refri erators, incorporating the " Me er-Miser " sealed units, are examples of the company's commercial equipment. Among other exhibitors showing refrigerators are Electrolux, Ltd., Astral Equipment, Ltd., the Alaska Trading Co. (Watford), Ltd., and Alfred Imhof, Ltd.

The fuel economy and cheapness of electric cooking are forcibly demonstrated on the Jackson Electric Stove Co.'s stand by means of a display which shows that it is possible to cook a meal for eight people using only 2¼ kWh of electricity, generated at the power station by less than 3½ lb of slack. Glass-backed cookers enable the actual cooking process to be seen. Cookers suitable for every type of home are shown by Belling & Co., Ltd., including models with illuminated ovens, inner glass doors and wheeled bases. Fires, food warming cabinets, clothes drying cabinets and towel airers are among other appliances chosen by this company for display. Oil filled radiators are available from Dimplex, Ltd., with loadings of from ½ to 2 kW and with feet, wall brackets and wheels. Hurseal oil filled radiators are to be seen in the Coates house.

Food mixers are shown by Kenwood Electrics, Ltd., and John Perry & Co. (Plastics), Ltd., the latter also including in their display examples of the Hawkins " Electric Hostess " and the " Tecal " automatic tea-making apparatus. By dispensing with the teapot the new " Goblin Teasmade " set made by the British Vacuum Cleaner & Engineering Co., Ltd., is considerably cheaper than its predecessor.

Another new " Goblin " product is the " Regal " upright bag type vacuum cleaner, which has especially powerful suction, together with such conveniences as a foot switch and a lamp for illuminating dark corners. Many other vacuum cleaners of up-to-date design are demonstrated by Hoover, Ltd., Electrolux, Ltd., Vactric, Ltd., Tellus Super Vacuum Cleaner, Ltd., and the Water Softener & Vacuum Cleaner Service, Ltd. (" Jifextra "). The " Trigga " spray gun which operates from a vacuum cleaner is available from the Ideal Spray Gun Co., Ltd. Ease of operation of its two-brush floor polisher is emphasized in the Hoover display, and three-brush types are demonstrated by Electrolux, Ltd., and Vactric, Ltd.

The services of a vacuum cleaner are also required for the operation of the " Bubble-washer " clothes and dish washing apparatus made by Cedar Merchandise Inc., Ltd. Bendix Home Appliances, Ltd., Thor

The " Goblin Regal " vacuum cleaner

Appliances, Ltd., Wilkins & Mitchell, Ltd. (" Servis "), Hoover, Ltd., and the British Vacuum Cleaner & Engineering Co., Ltd. (" Goblin ") all show their latest washing machines, trolleys for the last two mentioned units being available from Chardcraft Products, Ltd.

In addition to showing their latest washers, ironers, drying cabinets, water heaters, etc., H. Fisher (Oldham), Ltd., give a glimpse into the future by including in their display a miniature scale model of a kitchen covering a floor area of 8ft by 5ft and comprising working miniatures such as a sink unit, washing machine, dish washer, cooker, drying cabinet, refrigerator, ironer, etc. The public's reactions will, it is hoped, prove of value when the time for further development comes.

The problem of clothes drying in small flats is largely overcome by the use of a clothes dryer and airer demonstrated by J. & H. Walter, Ltd., makers of the cordless iron and board. The J. & P. Bruce " Flexaway " universal flex carrier can be used with any normal type of electric iron. The " Oprim " rotary ironer (Aircraft & General Engineering Co., Ltd.) is now made in both domestic and industrial models. The " Gem " instantaneous water heater is demonstrated by Rodway Jones & Co.

Three new " Rabaldo " dry shavers are introduced by John A. Fransen, Ltd., who are making a special feature of their " Forfex " hair dryer. Opportunities to try electric razors are also given by Remington Rand, Ltd., and Chilton Electric Products, Ltd., the latter company displays examples of both " Buk " and " Kub " models.

The Morphy-Richards shop, one of the features of the model village

For the gardener both the Nutt Engineering Co., Ltd., and the A.M.I. Lawnmower Co., Ltd. (" Ladybird ") show electric lawn mowers. A fly-killer which fits on to a lamp bulb is exhibited by Associated Fumigators, Ltd. The decorative aspects of lighting are the main impression received from inspection of the displays by Gleco Fittings, Ltd., Linolite, Ltd., British Electric Lamps, Ltd., the Stanley Light Co., and Lustro Distributors, Ltd.

The exhibition closes on 29th March.

St. Lawrence Power Project

THE Canadian Government has announced the setting up of a five-man board of engineers to further the power development phases of the St. Lawrence seaway project. The board includes three members appointed by the Federal Government and one each by Quebec and Ontario. The provincial representatives are Mr. R. L. Hearn (Toronto), general manager and chief engineer of the Ontario Hydro-Electric Power Commission, and Mr. R. Dupuis (Montreal), commissioner of the Quebec Hydro-Electric Commission. The board's job is to " co-ordinate " the preparation of an application by Ontario to the International Joint Commission for approval of power development works in the International Rapids section of the St. Lawrence. Its work will not be related to the seaway itself, though the power installations in the river will form an integral part of the overall scheme.

Under legislation adopted last session by the Canadian Parliament, Ontario was authorized to undertake the construction of the power installations concurrently with complementary works by an " appropriate authority " in the U.S., presumably New York State. The U.S. Government has agreed to co-operate with Canada in sponsoring applications to the Joint Commission which settles boundary problems for the two countries. Parliament also adopted legislation establishing a St. Lawrence seaway authority with power to build an all-Canadian seaway with or without the co-operation of the United States. Canada plans to construct the waterway alone if the U.S. Congress does not soon approve a joint project. The power phases call for the development of 2,200,000 h.p. in the International Rapids section of the river. It would be divided equally between Ontario and New York State.

VIEWS on the NEWS

By REFLECTOR

A DEAD set has been made against electric heating by politicians and others and the electricity supply authorities seem to have been hypnotized into silence. But Mr. A. M. F. Palmer, A.M.I.E.E., has raised his voice in the wilderness to come to the defence of electric heating. In a letter to *The Times*, replying to one by Mr. G. Nabarro, M.P., Mr. Palmer contends that the electric fire has been used as a scapegoat for the sins of others, largely industrial and commercial establishments. He deprecates the efforts to force consumers to use solid-fuel and gas fires and puts forward the many points which tell in favour of electricity.

* * *

Championship of electricity also comes from the Electrical Association for Women which has submitted a memorandum to the Ridley Committee on National Fuel Policy. The Association admits the necessity for the careful use of electricity, particularly during peak hours, but considers that the right of the housewife to freedom of choice should be inviolate. The adverse effect on the price of electricity of restrictions which would worsen the load factor is stressed. The Association's recommendations are that there should be research into methods of improving generating efficiency, the production of a wider range of thermal storage appliances and the improvement of heat conservation in buildings. Also there should be co-operation by housewives in avoiding peak hour use of electricity.

* * *

Many burdens are borne by the ordinary car battery and the fact that it lasts so long is a tribute to the makers. But although the normal work of the battery is onerous enough already there are always ingenious people trying to make it do a bit more. At a meeting of the Kettering Scientific Society Mr. B. Heyward (Lucas) told of a man who was actually running a refrigerator in the boot of his car. This, he said, was to keep his lunch cool. One can only speculate as to the nature of the "lunch."

* * *

Although most people will feel inclined to agree that the use of an electric shaver in the bathroom is undesirable and contravenes I.E.E. Regulations, the idea is scouted by "Pilgrim Three" in the March *Electrical Contractor & Retailer*. He implies that as a rule the bathroom is the only convenient place but he does admit that he has sought an alternative to the usual full-voltage arrangement (for other people). His conclusion is that only a 12 V razor supplied through a double-wound transformer would be satisfactory. But then he visualizes the owner having to carry a fairly heavy piece of electrical equipment about with him when he travelled—if he still wanted to use his electric razor. One amazing fact is revealed by the writer: it is that through some curious ideas of "balancing" on the part of the former supply authority he has a three-phase arrangement in almost every room of his house.

* * *

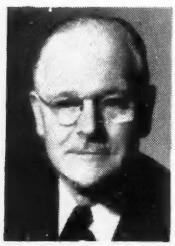
Villagers of Munslow, Salop, are said by the *Birmingham Evening Despatch* to have received their first payments in respect of rent for poles erected on their ground by the Midlands Electricity Board. In some cases large (in dimensions) cheques have been sent for sums as low as fourpence which has naturally aroused comment. The Board has explained that it sends out 20,000 wayleave cheques each quarter. "It sounds a sensible idea to send a few coppers instead of a cheque but in fact it would not be. We have worked out a streamlined system. Apart from checking there is no manual work. Most cheques are prepared on a machine." It still looks to the outsider as though a steam hammer is being used to crack a nut, albeit a "streamlined" hammer.

PERSONAL and SOCIAL

News of Men and Women of the Industry

IT is announced that **Mr. E. R. Radway,** M.I.Mech.E., A.M.I.E.E., A.M.I.Struct.E., has been appointed mechanical and electrical engineer, South Wales Docks. Trained at Swindon Railway Works, he entered the chief mechanical engineer's drawing office in 1932 where he was engaged on dock hydraulic and electrical work until 1946. After a period at Worcester as electrical assistant to the locomotive divisional superintendent he was transferred to the Cardiff Railway Division as assistant electrical engineer. In February, 1950, he was appointed electrical engineer, South Wales Docks, and in January, 1951, took on the additional responsibilities of mechanical engineer for Newport, Cardiff, Penarth and Barry Docks.

Mr. F. L. Castle, A.M.I.E.E., M.I.R.S.E., M.Inst.T., general manager of the Siemens & General Electric Railway Signal Co., Ltd., has been appointed a director of the company. Mr. Castle first served with the Midland Railway before joining the General Electric Co., Ltd., in 1919 to create a Railway Signal Department, of which he was appointed manager in 1922. On the formation of the Siemens & General Electric Railway Signal Co., Ltd., he was appointed that company's general manager. He is chairman of the Railway Brakes and Signals Industrial and Export Group, a member of the Council of the Institute of Transport, a fellow of the Permanent Way Institution, and a member of the Council of the Institution of Railway Signal Engineers. Mr. Castle has made many business journeys overseas. He was largely instrumental in securing for Great Britain the large contract for signalling the Toronto Subway, Canada.



Mr. F. L. Castle

Mr. L. Bagrit, managing director of Elliott Brothers (London), Ltd., left London by air last week for a business journey to the United States. His visit is associated, among other things, with the manufacture, under licence in the United States, of certain types of Elliott electronic apparatus.

Mr. W. Herbert has resigned his position as buyer and manager of the Electrical Department of Smith & Sons (Stoke Newington), Ltd., and has now joined Lewis & Lewis, wholesalers and distributors of electrical goods, of Great Portland Street, W, as sales manager and buyer.

Hopkinsons, Ltd., Huddersfield, announce the appointment of **Mr. H. L. Collins** as manager of their Controls and Soot Blower Division, following the retirement of **Mr. W. B. Dale. Mr. S. Brook** has been appointed manager of the Soot Blower Department.

Mr. H. A. S. Hazelwood, assistant engineer, engineer-in-chief's office, G.P.O., London, aged seventy, is retiring shortly after fifty-four years' service.

Mr. S. G. Poole, manager of the Peterborough District of the Eastern Electricity Board, will be retiring at the end of March after nearly fifty years' service. Mr. Poole was apprenticed to the Urban Electric Supply Co. at Stamford, Lincs., and later worked as mains engineer at Grantham and shift engineer at Salisbury before going to Peterborough in 1905 as a shift engineer at the Corporation's power station. Subsequently he became second assistant engineer in charge of mains, and then distribution engineer, which post he held on nationalization of the industry. Since vesting day he has been district manager of the Peterborough District of the Fens Sub-Area.

Col. H. G. Fraser, M.C., T.D., M.I.E.E., retired recently from the position of manager of the Newbury Sub-Area of the Southern Electricity Board, after nearly fifty years in the electricity supply industry. After education at the Manchester College of Technology, Col. Fraser served with the Stockport, Leigh, Blackburn and Wakefield undertakings. He held a commission in the infantry during the 1914-18 war and was awarded the M.C. for his part in the battle of the Somme in 1916. From 1920 to 1932 he was city electrical engineer of Wakefield and then went to Oxford in a similar capacity, remaining there until vesting day when he was appointed manager of the Newbury Sub-Area. In 1944 his services to Oxford were recognized by the conferment upon him of the honorary degree of M.A. by the University.

Mr. R. **A. Goslar** is arriving from South Africa on 18th March on a buying trip. He is interested in electrical accessories, switches and raw materials. His address during his visit will be c/o C. J. McBride & Co. (United Kingdom), Ltd., 61, Bartholomew Street, London, E.C.1.

A presentation of a grandmother clock and an inscribed gold watch has been made to **Mr. W. J. Walters,** of the B.T.H. works, Blackheath, Staffs, to celebrate the completion of fifty years with the company. Mr. Walters is chief of the Progress Department.

A. W. Bird, M.B.E., J.P., a former director of the Engineering & Lighting Equipment Co., Ltd., has been appointed independent chairman of the newly formed Eastern Region Housing Production Board. The headquarters of the Board are at Cambridge.

The third annual reunion of the former **Electricity Commissioners** and members of their staff was held at the Barley Mow, Horseferry Road, London, S.W., on 7th March. Between fifty and sixty were present and among them were Mr. C. G. Morley New, Mr. H. Nimmo, Sir John Dalton, Mr. A. E. Marson and Mr. Alan East. During the evening messages of good wishes were read from Lord Hurcomb, Sir John Kennedy and Sir Harry Haward. The last named was the first vice-chairman of the Commission (1920-30); he is now in his eighty-ninth year and living at Bournemouth.

The **Association of Steel Conduit Manufacturers** held its annual dinner at the Midland Hotel, Birmingham, on 20th February. Approximately sixty members and guests were present. The toast of the Association was proposed by Mr. C. R. Wheeler, C.B.E., and Mr. J. M. Surrall, chairman, responded. Musical items were rendered by the Harris-Powell trio and the Foxhill singers.

For this year's annual dinner the **Ipswich and District Electrical Association** chose Colchester. Mr. H. B. Campbell, chairman, presided at a large gathering at the George Hotel last Friday. Lord Citrine (chairman, B.E.A.) was the principal guest and proposed the toast of the Association. He said that one object of the Association was to encourage friendship and co-operation between all sections; that, too, had been the aim of the B.E.A. since its inception. Speaking of the Authority's plant difficulties, Lord Citrine said that they could not hope to balance supply and demand until 1956 at the earliest. In the course of his reply to the toast Mr. Campbell regretted the absence of Mr. H. E. Blackiston who founded the Association twenty years ago.

The toast of "The Electricity Industry" was put by Ald. S. C. Grimwade (deputy chairman, Eastern Electricity Consultative Council) and replied to by Mr. W. N. C. Clinch (controller, Eastern Division, B.E.A.). "Our Customers" was proposed by Mr. S. F. Steward (chairman, South Western Electricity Board), a past-chairman of the Association, and the response was by Ald. W. J. Bennett (chairman, Eastern Electricity Consultative Council). The health of the guests was proposed by Mr. C. T. Melling (chairman, Eastern Electricity Board), president of the Association, and Ald. A. J. Colthorpe (Mayor of Ipswich) replied.

A large gathering of **Johnson & Phillips** employees and their friends were present at the company's works canteen last Friday for a social function which included the annual presentation of sports trophies and prizes by Mr. R. W. C. Reeves, a director. After the presentation the audience was entertained with

At the annual dinner of the Association of Steel Conduit Manufacturers held in Birmingham

music, dancing and a stage show. Earlier in the evening, the Social Club had entertained about fifty of the company's old-age pensioners at a dinner party.

Sir George Paget Thomson has been elected Master of Corpus Christi College, Cambridge. He is the son of the late Sir Joseph J. Thomson who was Master of Trinity College for thirty-two years.

Another successful year culminated in the annual presentation concert of the **Telcon Social and Athletic Club**, which was held on 5th March at Greenwich. Mr. J. N. Dean, managing director, Telegraph Construction & Maintenance Co., presented prizes to the winners of the sporting events who were introduced in turn by Dr. G. A. V. Sowter. Mr. W. R. Martin, personnel manager, then introduced employees who had completed fifteen and twenty years' service, and Mr. Deacon presented each of them with a long-service certificate. Those with twenty-five years' service also received a presentation clock.

A happy outing was enjoyed recently by 270 children of employees of **Frederick Smith & Co.**, Salford. The Welfare Council organized and paid for the outing, which consisted of a visit to the circus at Belle Vue, followed by tea in the Exhibition Hall Restaurant, Belle Vue

OBITUARY

Mr. W. T. Knorr, managing director of Electric Boiling Plates, Ltd., died on 27th February at the age of eighty-six. Mr. Knorr spent seventy years in the electrical industry, being actively engaged until shortly before his death. He served his apprenticeship with Siemens Bros., of Woolwich, and later joined the staff of Johnson & Phillips, Ltd., of Charlton. He commenced business on his own account under the name of the Universal Electric Manufacturing Co. in 1901 and in 1931 he opened a factory for the manufacture of electric boiling plates. The name of the concern was changed to Electric Boiling Plates, Ltd., in 1946.

Mr. P. C. Pope.—The death occurred on 1st March, at the age of eighty, of Mr. Philip Crosby Pope, who, until his retirement in 1946, was secretary of the Institute of Fuel.

Mr. Pope served an apprenticeship with Richard Hornsby & Sons, Grantham, and also with Laird Bros., at Birkenhead. His first appointments were with the British Westinghouse Co. and the Lancashire Power Co., and early in this century he became the agent in Manchester for Siemens Bros. & Co., Ltd. Up to this stage he had been engaged largely in the application of mechanical and electrical power in collieries. After the 1914-18 war he became interested in the low-temperature carbonization of coal. In 1925 he was chairman of the Council of the Institution of Fuel Economy Engineers, and he was a moving spirit in suggesting the merging of this Institution and the Institution of Fuel Technologists in what, in 1927, became the Institute of Fuel. In September of that year Mr. Pope became the secretary of the Institute. On his retirement he was made an honorary member and for a term was adviser to the Council.

Mr. G. W. H. Clifford.—The death occurred on 3rd March at the age of seventy-four of Mr. George William Henry Clifford, who was employed on the clerical staff of Johnson & Phillips, Ltd., up to the time of his death. He had the distinction of being both the oldest employee and the longest serving employee on the company's staff, his service with J. & P. dating back to 1891.

Mr. W. Lethersich, B.Sc., A.M.I.E.E., F.Inst.P., a member of the staff of the Electrical Research Association, died on 2nd March at the age of forty-five. Mr. Lethersich was a leading expert on the mechanical properties of dielectrics, and also the originator of the use of the Schlieren method of photography to determine the flow of hot air round lamp fittings.

WILLS

Mr. G. Hughes, managing director of Gordon Hughes Electrical Co., Birmingham, who died on 25th October last, left £26,184 gross (£26,103 net).

Mr. J. D. Midforth, M.I.E.E., Sub-Area engineer No. 1 (Southall) Sub-Area, Southern Electricity Board, who died on 1st November, left £3,940 gross (£3,895 net).

Mr. D. Jefferson, electrical contractor, Barrow-in-Furness, who died on 9th July, 1950, left £1,534 gross (net value nil).

Mr. C. H. G. Hobday, managing director of Hobday Bros., Ltd., who died on 1st September, left £51,068 gross (£50,435 net).

Automatic Computer for Canada

A SECOND machine in the series of automatic digital computers which is being made by Ferranti, Ltd., has now been completed. It has been ordered by the National Research Council of Canada and is being shipped early in April to Toronto where it will be erected in the University. The first machine was made for Manchester University and since it was handed over last July its performance has been most successful and it now works 24 hours a day on a wide variety of problems. Experience with this machine has enabled a series of detailed improvements to be made in the design of the second one, which it is considered will provide the Canadians with computer facilities second to none in the world.

Shipyard Lighting

THE lighting of shipyards was the subject of a paper presented by Mr. J. S. McCulloch to the Illuminating Engineering Society in London, on 11th March.

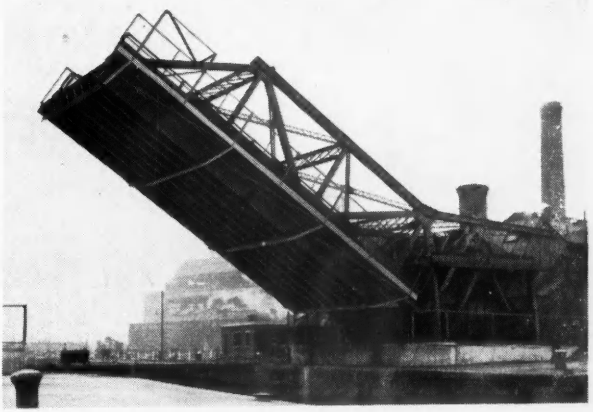
As little information about this subject had previously been published the author first dealt with the needs of both indoor and outside working areas, particularly the latter, before describing a typical large installation in a North-East coast shipyard with the aid of a chart indicating the sequence of operations. Recommended values of illumination for various workshops and outdoor erection spaces were included.

The number of ships a yard could build in a year was limited normally by the period the vessel occupied the building berths. The future of artificial illumination in shipyards would thus depend upon how well their needs could be satisfied. In the author's opinion the artificial lighting of outside working areas was economically practicable, except for the building berths. For the latter the author offered a compromise installation which, however, he admitted had limitations.

Surrey Lock Bridge

THE new 720-ton single leaf rolling lift bridge which has been built by the London County Council across the Surrey Lock entrance to the Surrey Commercial Docks, London, at a cost of £110,000, was officially opened last Friday by Viscount Waverley, chairman of the Port of London Authority, when he took "personal delivery" of the structure from Mr. J. W. Bowen, chairman of the L.C.C. The cost of the bridge is being shared between the two authorities and the Ministry of Transport; it will be operated and maintained by the P.L.A.

The original swing bridge, which was built in 1858, was damaged by bombing in September, 1940, and although for eleven years it continued to serve as a road and footbridge it blocked an important access to the docks for all vessels except barges. Apart from allowing shipping in and out of the dock once more, the new bridge has a much wider carriage way for the heavy traffic to and from the docks.



The new rolling lift bridge over the Surrey Lock entrance to the Surrey Commercial Docks

The new bridge, for which the main contractors were Sir William Arrol & Co., Ltd., is equipped with Igranic motor control gear which automatically controls all its movements and in spite of its great weight it is so finely balanced that it can be raised or lowered in 3·5 minutes, even against a 70 m.p.h. gale. Altogether there are five English Electric motors, which operate from three-phase 430 V 50 c/s mains; these comprise two 50 h.p. main slip-ring machines, two 5 h.p. squirrel-cage pony motors and a 1·5 h.p. squirrel-cage bolt motor. The control gear consists of a contactor type main control panel of open construction and auxiliaries such as electromagnetic brakes and limit switches. The bridge is operated from an Igranic five-position master controller and the sequence of operation is fully protected and indicated by signal lamps on the main panel.

I.E.S. Liverpool Centre

THE annual luncheon of the Liverpool Centre of the Illuminating Engineering Society was held at Liverpool on 3rd March and was attended by many of the chief officers of the Mersey and North Wales Electricity Board, civil dignitaries and representatives of leading manufacturers of electric lighting equipment. Mr. D. St. C. Barrie, A.M.I.E.E., who presided, alluded to the sorrow felt by all members of the Centre at the death of Mr. K. Mackley, who had been secretary for many years. Mr. J. G. Holmes (president, I.E.S.) while commending the Liverpool Centre on having built up a membership of 120, regretted that there were so few student members. The Lord Mayor of Liverpool (Ald. Vere E. Cotton) and Ald. A. Critchley, chairman of the Liverpool City Lighting Committee, also spoke.

Television in Scotland

The New Kirk o'Shotts Station

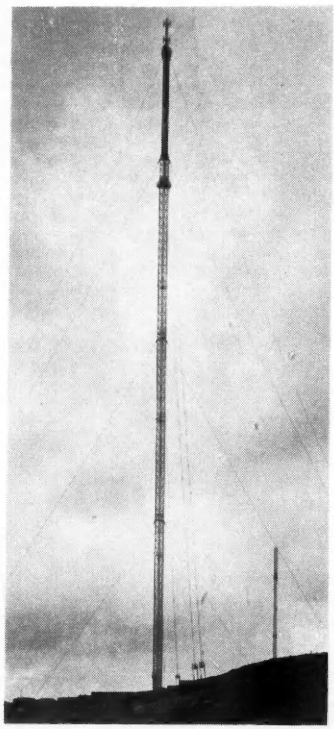
OVER four million people will be served by the Kirk o'Shotts television transmitting station, which is being officially opened to-day. Now television programmes will be within the reach of about 68 per cent of the total population of the United Kingdom. The new station is roughly midway between Glasgow and Edinburgh on a site 900ft above sea level. The 750ft mast raises the total height of the vision and sound aerials to over 1,600ft, and this is an important factor in securing the greatest possible service area, particularly in hilly country such as that lying to the north of the new transmitting station.

The first regular programmes will use the medium power vision and sound transmitters and the main mast and aerial system. This is an experimental service which will continue until the high power transmitters are completed later in the year. The vision transmitter will operate on a frequency of 56·75 Mc/s and the sound transmitter on 53·25 Mc/s.

These medium power transmitters, which will ultimately be held in reserve in case of a breakdown of the high power transmitters, were built to B.B.C. specification by Marconi's Wireless Telegraph Co., Ltd. They form a completely separate installation and are housed in an annexe to the main building. The high power vision and sound transmitters are being built by Electric & Musical Industries, Ltd., and Standard Telephones & Cables, Ltd., respectively.

The medium power vision transmitter is of the low level modulated type with a peak white output power of 5 kW. Modulation is carried out at the 500 W level and the signals are then amplified by two class "B" wide-band linear r.f. amplifiers each using a pair of English Electric type 5762 forced-air-cooled triodes. The appropriate shaping of vestigial side-band signals radiated by the vision transmitter is carried out in its own circuits, and not by a separate vestigial side-band filter as in the case of the high power transmitter. The valve filaments are a.c. heated, with the exception of those in the modulated amplifier and the linear amplifiers which derive their supply from metal rectifiers. The transmitter h.v. supplies are obtained from hot cathode mercury vapour rectifiers which provide a maximum of 3,000 V for the anodes of the linear class "B" amplifier stages.

General view of main and standby masts



The sound transmitter has an output power of 2 kW and is of the conventional class "B" modulated type. All valve filaments are a.c. heated and as in the case of the vision transmitter, the crystal controlled drive and the power conversion equipment are built as an integral part of the transmitter. The vision and sound outputs are combined in a Maxwell bridge diplexer type combining unit adjacent

to the transmitters and the combined output is fed into the main aerial transmission line system at a point close to the mast base.

Both transmitters are contained in similar sheet steel cubicles mounted side by side and to present a single continuous front in the transmitter hall. The air blast cooling equipment and combining filter are mounted behind the transmitter cubicles, which are built into a sound-proof partition wall, so as to isolate the noise of the air blowers from the control desk situated immediately in front of the transmitters.

Engineers adjusting the 5 kW medium power vision transmitter in the control room. The desk in the foreground incorporates controls for both sound and vision transmitters

The vision programme is received at the station over the G.P.O. distribution network which consists of the 1in tube coaxial cable system from London to Birmingham, the ⅜in tube coaxial cable system between Birmingham and Manchester, and a Standard Telephones radio relay link between Manchester and Kirk o'Shotts. The Post Office radio receiving terminal at Kirk o'Shotts is housed in its own building on the site and the video frequency output from it is conveyed to the transmitting station by a short length of ⅜in coaxial tube. The sound programme reaches Kirk o'Shotts over specially equalized G.P.O. telephone circuits similar to those used for other B.B.C. transmitting stations.

The mast and aerial system, which are designed to accept the full power from the main transmitters, are of generally similar construction to those already in use at Sutton Coldfield and Holme Moss. A separate 150ft mast carries the emergency aerials system for use in the event of a breakdown in the main aerial or transmission line. These are separately fed and switches are provided to enable a rapid changeover to be made from the main to the standby system.

The outputs of the main vision and sound transmitters are combined at ground level and a single transmission line is used to convey this combined output to the common aerial system at the top of the mast. The transmission line, which was developed and built for the B.B.C. by Electric & Musical Industries, Ltd., is of novel construction. It is of the coaxial copper tube type but in this instance the inner tube has been replaced by a locked coil wire rope, the outer layer of wires being made of high-conductivity copper. This rope, together with the 5in diameter copper tube forming the outer conductor, is suspended pendulum fashion from a support at the top of the mast. The wire rope is tensioned at the lower end by a loading mechanism designed to apply a force of about two tons. The rope is located coaxially with the outer conductor by small rod insulators, spaced at 120 deg, projecting from the inner surface of the tube at suitable intervals. This type of transmission line has a very high degree of electrical uniformity which is a necessary characteristic of lines intended for wideband television transmission.

Power for operating the station is supplied by duplicate feeders from the South West Scotland Electricity Board's 11,000 V three-phase network and stepped down to 415 V three-phase by duplicate 500 kVA transformers. These, together with the h.v. switchgear, metering equipment and main l.v. switchgear, are housed in the annexe building.

The range within which consistently good reception of the programmes broadcast by

General view of the G.P.O. radio link terminal station at Kirk o'Shotts

Kirk o'Shotts can be expected depends upon many factors, the chief of these being the presence or absence of high ground between the station and the reception point, the height of the receiving aerial, and the amount of electrical interference. The medium power transmitters will provide satisfactory service over a considerable area of Central Scotland, including Edinburgh and Glasgow; but reception will of course be more liable to interference, particularly in fringe areas, than it will be when the high power transmitters come into service.

The principal contractors for the new station were as follows:—

Vision (5 kW) and sound (2 kW) transmitters, aerials and medium power vision and sound transmitter combining filter unit.—Marconi's Wireless Telegraph Co., Ltd. Main transmission lines and high power vision and sound combining filter.—Electric & Musical Industries Research Laboratories, Ltd. Main low-voltage switchgear.—Brush Electrical Engineering Co., Ltd. 11 kV/415 V transformers.—English Electric Co., Ltd. High-voltage switchgear.—Switchgear & Cowans, Ltd. Auxiliary low-voltage switchgear.—Standard Telephones & Cables, Ltd. Emergency lighting battery.—Alton Battery Co., Ltd. Wiring.—Malcolm & Allan, Ltd. Station earthing system.—J. W. Gray & Co., Ltd. Valve cooling and ventilation.—Rosser & Russell, Ltd. Coaxial cable to reserve aerials.—Telegraph Construction & Maintenance Co., Ltd. Masts.—British Insulated Callender's Construction Co., Ltd. Roads and buildings.—M'Lean & Co., Ltd.

The G.P.O. was responsible for the provision of the programme link and the associated control equipment. The main contractors to the G.P.O. were Standard Telephones & Cables, Ltd.

The Budget

THE Chancellor of the Exchequer (Mr. R. A. Butler) introduced his first Budget on Tuesday. In his speech he stressed this country's grave position and expressed the Government's determination to restore the balance by restricting imports, increasing exports and reducing home investment and consumption. As regards imports, Mr. Butler said that the open general licence would be withdrawn from a further list of goods, including electrical equipment such as cooking apparatus, heated blankets and pads, vacuum cleaners, floor polishers, coffee percolators, hairdressing appliances, and lamps. No applications for the duty-free importation of machinery posted after that day (Tuesday) would be considered.

The Bank Rate was raised from 2½ to 4 per cent. An excess profits levy, taking effect from 1st January this year, would be imposed on current profits exceeding the standard profits for three years. It would be at the rate of 30 per cent net with a ceiling of 18 per cent on total profits. The normal standard would be the average profit for 1947–48–49 and the minimum standard £2,000. For businesses set up after the middle of the standard period the standard would be 10 per cent of the paid-up capital. The levy would not extend to partnerships or individuals who had to pay surtax. He proposed to reduce the present profits tax to 2½ per cent on reserves and 17½ per cent on dividends. The petrol and oil tax would be increased by 7½d a gallon. There would be higher charges for certain telegraph and telephone services. Income tax allowances and rates were to be adjusted for the benefit of the lower paid workers and there would be some relief for those with small investment incomes. There would also be an adjustment of pensions and contributions. He said that supplies of steel from the United States should enable the upward movement in production to be resumed.

Industry and the House

The Struggle for Survival

By T. F. COOK, M.P.

THERE has been an electric atmosphere around the House of Commons since the beginning of this Parliament. We have had the sudden flare-up on the resignation of Mr. Steven Hardie, chairman of the Iron and Steel Corporation. Mr. Hardie insisted that his Board's profits should have carried the burden of higher costs and thus prevented the sharp rise in steel prices. Many experts had been saying that prices would have to be raised to cover increased costs but the problem was and still is, where is inflation of this kind to end? This further rise in steel costs will have a serious effect on our export prices particularly at a time when German and Japanese competition in our markets is rapidly increasing. So too will the increase fall heavily on the armament programme and many people in the House and the country feel that the present trend will make the proposed three to four years' £5,000 million expenditure dissolve like a tablet in a glass of hot water.

Cost of Rearmament

The questions have been raised whether we can go on spending these vast sums without either destroying ourselves economically or becoming completely dependent on America. Either course would be disastrous for us as a proud nation with hundreds of years of world leadership behind us. No one should ever be allowed to forget the fact that in this country we have the greatest "international diplomacy" brains in the world, but this is not of itself enough in this modern age. It is asked whether we are fighting hard enough to ensure proper international control of the allocation and prices of raw materials, and whether we should not be spending more on development in the underdeveloped territories of the Commonwealth.

These are only some of the questions which demand urgent answer if we are to strengthen our economy and remain a world power.

These important problems have been overshadowed by the Bevan affair. Mr. Bevan and his associates do not dispute the need for rearmament but the scale of it. On this a major battle has started in the ranks of the Labour Party, but so far as can be seen in the House there is no comparison between the present situation and 1931 as so many people seem to think. According to well-informed circles this is a struggle for leadership not in the personal sense, but in the policy sense and is an extension of the Scarborough Conference struggle.

In the inner political circles the Government's handling of the present economic situation commands the centre of the stage. By the time this article appears in print we will know the short-term proposals but will they provide the long-term answer? Mr. Butler, for some reason for which we do not yet know the answer, delayed his Budget statement by a week, a delay which rather upset the city and industry. It is said that the main reason for this was the attack by the Government's "rank and file" on the Chancellor's proposed drastic cuts in the social services. The general feeling is that Mr. Butler approached the hurdle and then shied at the jump, feeling that while the protests of the Opposition were one thing, rebellion in the ranks behind him was another. But for whatever reason it had a most disturbing effect on the commercial life of the country.

The Steel Position

Mr. Sandys has also been in the wars on the question of the steel cuts and has been the subject of attack by several of the big ship-building firms. The impression is gaining ground in the steel-using industries that the allocation plan has been ill-conceived. A large number of members are of the opinion that the Ministry of Supply should sit back and take much closer stock of the present position. The case cannot be made that defence require-

ments have made cuts of this size essential (although some cuts were necessary) since it is clear that the Government has been running down the stock pile of strategic raw materials and of food. This could be heartening news as it seems to prove that the immediate danger of war has passed. But as has been pointed out in these articles on previous occasions, the feeling in political circles is hardening that the Government will have to make up its mind very quickly " to plan or not to plan."

The latest news of major import cuts by Australia adds difficulty upon difficulty and it has become abundantly clear that unemployment is more than just a threat in several industries as a result of the announcement in Canberra on Saturday. Unless British manufacturers can very quickly switch cancelled orders to North America or other overseas markets, which looks unlikely, many more workers are likely to be laid off in the textile industry. New pockets of unemployment will begin to show themselves in other types of consumer goods industries. This being so there is a feeling in the House that Sir Walter Monckton's effort in putting over the new Control of Engagements Order was unnecessary. Australia has not of course introduced these cuts for the sheer joy of making cuts. They have been imposed to stop the very rapid run down of Australia's sterling balances, which reliable authorities consider have dropped from £640 million sterling to £240 million since last autumn. It should be pointed out, however, that these cuts will, at the same time, reduce considerably Australia's dollar imports. They should also help to stop the leakage of the gold and dollar reserves of the sterling area.

In normal circumstances this would be an important step towards the restoration of confidence in the pound sterling. But again reliable quarters in the Commons are asking where is this going to stop? The question is being asked here also, are we moving rapidly towards another 1929, when we should by all the rules be living in a period of economic expansion? The major issue is how we can organize with our friends a lasting solution to the ragged economies of Europe. A decision on these lines must be found by the Government if we are to survive.

These are only some of the questions confronting the leading statesmen of the Western world to-day. All else, according to knowing observers, is quite unimportant. There is no point in talking glibly about a " tough " Budget if it does not provide the answers to some, at least, of the questions posed here. Writing before the event we can only hope that Mr. Butler will endeavour to do this.

Engineering Appointments

THE yearly statement about the activities of the Professional Engineers' Appointments Bureau (registrar: Mr. J. Muil) shows that offers of employment in 1951 far exceeded the number of actual appointments, again owing to abnormal demands for men of special experience.

The number of placings increased and there was a record income from fees. Nominations to vacancies exceeded those made in previous years while the number of inquiries from employers was well maintained.

Vacancies totalled 1,070, of which 314 were for civil, 503 for mechanical and 253 for electrical engineers. These figures only relate to notifications where it was possible to make a selection from the available register, otherwise the indications of supply and demand from the resultant total would tend to give a false impression. Overseas vacancies were approximately 30 per cent of the total notified, the majority of which were for the Middle East, West and East Africa, India and Pakistan. The total number of nominations made was 7,276, of which 2,050 were civil, 3,444 mechanical and 1,782 electrical. Enrolments at the end of the year totalled 1,679 compared with 1,947 in 1950 and 1,981 in 1949; civil engineers accounted for 385, mechanical engineers for 766 and electrical engineers for 528. The general shortage of qualified engineers might have been a contributory cause of the decrease in registrations. Suitable living accommodation and the education of children are often the major reasons why many men, who might otherwise consider making a change, decide it is in their own interest to remain in their present jobs.

Large numbers of both engineers and employers visited the Bureau. The policy of encouraging a personal review of the register by the employer affords the opportunity of a more detailed discussion on the type of candidate best suited to the particular requirements of the vacancy.

Industry continued to support the activities of the Bureau in various ways. Donations totalled £2,563 compared with £1,041 in 1950. The increased placings naturally caused the revenue from appointment fees to rise but, as expenses incurred were much greater than the income received from the fees charged, it was the larger sum received in donations which enabled the Bureau to meet its liabilities.

PARLIAMENTARY NEWS

From Our Special Reporter

IN the second reading of the British Transport Commission Bill, Mr. Ernest Davies, speaking of the need for an overhaul of railway rolling stock, said that there had been considerable investigation into the possibility of electrifying the suburban services on the London–Hertford line and on the suburban system generally. He understood that it had reached the next priority after the electrification of the line to Southend, but, owing to the curtailment of capital investment these further electrification schemes had been held up, and that the next priority had been indicated to be the building of a tube connecting the main terminals in London and linking with this suburban system which would be electrified. In view of the high cost of tube construction to-day he urged the Minister to consider first the electrification of this suburban system and to defer consideration of tube construction for the present. Electrification paid handsomely, as had been shown by the Shenfield electrification, where receipts had gone up some 40 per cent and passenger journeys by some 48 per cent.

Mr. Barnes, former Minister of Transport, said he was anxious that the Fenchurch Street and Liverpool Street to Southend electrification should not be held up. The project was going forward when he left office, and he would like an assurance that the work would proceed.

Mr. Maclay, Minister of Transport, said in reply to Mr. Barnes, that no fewer than five of the works scheduled in the Bill were concerned with the Tilbury section, and, also, ultimately the electrification of the line. Electrification had not been stopped.

Dockyard Electrical Departments

Mr. Foot asked the First Lord of the Admiralty what changes he proposed to make in the number of civilian managers in charge of the electrical departments of the Royal Dockyards.

Mr. J. P. L. Thomas said that no change in these posts was contemplated at present, but it was intended that in due course they would be filled by naval officers of the Electrical Branch.

Better Use of Coal

On Friday last Mr. Philips Price (Labour) moved a resolution urging the Government, public administration and industry, to take comprehensive measures for the better use of coal, "so that waste may be eliminated and more coal be made available for export and other purposes vital to our national economy."

Mr. Price declared that it should be possible to save 10 million tons of coal a year in industry. This, with savings in other directions, should give a total saving of 20 million tons a year. While domestic coal consumption had decreased from 45 million tons in 1938 to 32 million tons in 1950 by a system of rationing, gas undertakings consumed 26 million tons in 1950 compared with 19 million tons in 1938—an increase of 30 per cent. Electricity generation, which consumed an equivalent of 14 million tons of coal in 1938, in 1950 consumed 33 million tons—an increase of 140 per cent. The open fire was from only 20 to 25 per cent efficient in its consumption of coal; gas was 45 to 50 per cent efficient. Electricity was transmitted without much loss but in its generation only 20 per cent of the heating capacity of the coal was used. He was assured, however, that by various new methods it was possible to raise that figure to 25 per cent. The fact remained that electricity was an extremely wasteful way of using heat. But we could not, of course, do without it; far from it. Indeed, it was extremely important for power and lighting. For heating, however, we must take some action to restrict its uses, realizing, at the same time, that thousands of housekeepers throughout the country had no other means of carrying on. He suggested the installation of efficient solid fuel stoves, and the reduction of purchase tax on certain approved fuel-saving appliances.

In the industrial sphere a great deal would be saved by the electrification of the railways, but the capital cost was too heavy in times like these. The Regional Boards for Industry had done much by arranging for the staggering of electrical loads at peak periods. He felt it might be possible to bring our consumption of coal for all purposes down to 220 million tons a year and the National Coal Board suggested that it might be able to produce up to 240 million tons a year, leaving 20 million tons for export. But all this would be spoilt if certain authorities, particularly the British Electricity Authority, were allowed to consume wastefully up to 50 million tons a year. There must be co-ordination between the using services. No nationalized corporation should be allowed to go ahead without reference to the others. The plans of the British Electricity Authority must be confined to industrial power and lighting and so far as possible it must be discouraged from using coal for heating purposes.

Mr. Nabarro (Conservative), who seconded, said that we deep-mined last year 211 million tons of coal. The British Electricity Authority was at present consuming at the rate of 35 million tons of coal a year. If the capital investment programme of the B.E.A. was carried

out power houses would require no less than 65 million tons of coal in 1965—30 million more than at present, and more than the increase envisaged by the National Coal Board. That meant that industry could expect no more, nor would there be more for the gas industry or for export, and the domestic consumer would continue to be starved.

There were enormous savings of coal to be obtained by the correct insulation of industrial buildings and he urged the use of back-pressure generation methods. By these, efficiency could be raised from between 20 and 22½ per cent to as high as 70 and even 80 per cent, given a proper balance of power and heating loads. Standby charges should be eliminated, and the B.E.A. should still further relax its restrictions on the installation of independent plant.

Mr. Noel-Baker, the former Minister, said that he was all in favour of using waste steam for the back-pressure generation of electricity. But he believed that the B.E.A. showed a very liberal spirit in these matters. We should not over-estimate what could be done by back pressure. He was given an estimate, which might be too modest, that if we used back-pressure generation everywhere, in addition to obtaining higher efficiency in the use of coal, we should have an additional supply of perhaps 500 MW. If that was right, it must be compared with 1,100 MW added last year.

Mr. Nabarro said that the figure of 500 MW applied to industry only. Back-pressure generation was ideally suitable for a new town, for instance, for generating electricity, heating blocks of flats and so on, and resulted in enormous economies in coal.

After further debate, Mr. Geoffrey Lloyd, Minister of Fuel and Power, in reply, said that however high coal production was, a great contribution from coal conservation would be needed. These matters had to be approached in a practical way and with great urgency. Although the electrification of the railways might save 7,500,000 tons of coal a year it would cost about £1,000 million. The co-ordination of the fuel and power industries themselves was immensely important.

The Government and the B.E.A. wished to encourage the installation of back-pressure turbines in suitable factories. But this system had to be designed according to the needs of each particular factory. It depended on the difference between requirements for heat and electricity in the factory as to whether they could be exactly matched—which was almost the ideal—or whether they would still need to take some power from the B.E.A. or have a surplus which, because of high efficiency, they would actually be able to sell to the B.E.A.—and that was an economic proposition from the point of view of the country as a whole. The merits of each case had to be carefully considered; they could not be put on a completely standard basis. That was why they met difficulties when certain manufacturers considered that they were not being fairly treated by the B.E.A. All he could do was to promise that if such cases arose he would go most carefully into them.

There was a growing awareness on the part of industry that insulation and the installation of fuel-saving equipment usually paid very quick returns in terms of fuel saved. The Government was doing what it could to ensure that the supply of fuel-saving equipment and the materials for insulation were adequate, and they considered that in view of the quick return normally yielded a great many firms would insulate their factories and install the equipment in their own interests and from their own funds. That would take up the bulk of the equipment and raw materials likely to be available in the near future. There were, however, some firms which might not feel able to use capital resources of their own for the purpose, but which could save substantial quantities of fuel if loans, say, for three, four or five years were made available to them. The Government was informing industry that it was prepared to make arrangements whereby, experimentally for one year in the first place, £1 million would be made available at full commercial rates for such loans. That would cover both structural insulation of factories built before a date to be prescribed, and installation, also by a prescribed date, of approved equipment that would save substantial amounts of fuel.

The resolution was agreed to.

N.W. Consultative Council

On Monday Lt.-Col. Schofield asked the Minister of Fuel and Power how many persons on the North Western Electricity Consultative Council represented industry; whether he was satisfied that this small proportion of industrial representatives on these Councils ensured that industrial interests were given the necessary priority in the present economic emergency; and if he would take steps at an early date to review the system of appointing these Councils with a view to its amendment.

Mr. Geoffrey Lloyd said that the North Western Electricity Consultative Council comprised among its 27 members a deputy chairman nominated by the National Union of Manufacturers, another member nominated by the Federation of British Industries and a third member from the Association of British Chambers of Commerce. In addition it was known that other members had industrial interests. He would bear in mind the point raised, but any major change would require legislation.

Lt.-Col. Schofield asked the Minister if he would reconsider the recently proposed increased charge for industrial electricity in the North West. Mr. Geoffrey Lloyd said he did not think such a direction was necessary. The fixing of tariffs in an Area was the responsibility of the Electricity Board.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.

Space Heating Radiators

CONCERNING the relative merits of water and oil in electric central heating radiators, while a non-inflammable medium appears to have certain obvious advantages, the essential characteristics of a really satisfactory, entirely foolproof, radiator appear at first sight to be contradictory.

Experiment has proved that there is a certain optimum quantity of water which will ensure a reasonably uniform external temperature and at the same time permit a sufficient cushion of air to remain at the extreme top of the shell to prevent any dangerous internal pressure being generated up to the normal boiling point of water.

A standard water heater thermostat not only limits the maximum temperature of the radiator to 190 deg F, but also secures very considerable economy in operation. Experience has proved that such radiators on very many occasions can be satisfactorily operated at 140 deg F, thus saving considerable electricity, the thermostat only being turned to the higher temperatures in really cold spells.

Thus a water filled radiator may be completely sealed and will be perfectly safe in operation, so long as the thermostat continues to operate.

If, now, the surface area is adjusted in relation to the electrical loading so that the shell will dissipate the heat applied to the water by the immersion element at a temperature below the normal boiling point of water, the apparatus will continue to be perfectly safe, even if the thermostat fails to operate.

The radiator would, however, still be a potential source of danger if it should be heavily shrouded, with damp coats for example, when the thermostat is out of action. This risk can be avoided by the addition of a safety plug with a really positive action, which will automatically release any internal pressure at some predetermined temperature above the normal boiling point of water. External scalding at the moment the safety plug operates can be obviated by attaching a small steam diffuser to the safety plug.

The chemical treatment of the water to prevent corrosion, or oxidation, of the interior of the shell presents no difficulty. If a pressed steel shell of suitable design is adopted, it can be frozen completely solid without any ill effect when subsequently switched on.

Explosion, or fire, under exceptional fault conditions is entirely eliminated. In the event of an external fire water has obvious advantages. Should a leak occur, and this happens occasionally even in the best regulated apparatus, the water would have no injurious effect upon carpets or furnishings.

The specific heat of water is approximately twice that of oil, so that the water filled model will take substantially twice as long to reach its operating temperature from cold, but it will continue to radiate heat for a proportionately longer period after being switched off.

With a sealed radiator having its source of heat within the shell, the maximum surface temperature is dependent upon its electrical loading and its ability to dissipate heat. For a given shell temperature, however, the temperature of the heating element is considerably lower in the case of water than with oil. This should tend to increase the life of the immersion heater. It would appear, for this application, that water is a better heating medium than oil.

It is therefore possible to design a water filled electric central heating radiator which is completely safe and foolproof under all conditions, and there appear to be a number of good reasons for so doing.

Newport, Mon. J. C. SANDERS,
A.M.I.E.E., A.M.I.P.E.
Works Director,
Santon, Ltd.

Lighting for Coal Production.—A special lecture on this subject under the auspices of the Lighting Service Bureau is to be given at Newcastle-on-Tyne on 27th March. Tickets may be obtained from Mr. R. J. Fothergill, N.E. England Area Engineer, Lighting Service Bureau, 60, Stockton Road, West Hartlepool, Co. Durham.

Electrical Commercial Travellers

BENEVOLENCE is the main object of the Electrical Trades Commercial Travellers' Association and it was the keynote of the speeches made at the annual luncheon of the Association held at the Connaught Rooms, London, W.C.2, on Friday last, over which Mr. A. Watson (chairman) presided.

Appropriately the first speaker was Mr. S. Johnson (charity steward), who, in making an eloquent appeal for the Association's charities, mentioned that last year it contributed 225 guineas to the Royal Commercial Travellers' Schools. The Association felt that a special effort should be made for the E.I.B.A. in recognition of the work of Mr. H. A. Deacon, the immediate past-president of the E.T.C.T.A., and the Association had donated 300 guineas to the E.I.B.A. funds. Mr. Johnson mentioned that the membership of the Association was now well over 700.

The toast of the Association was proposed by Mr. Collin Brooks (editor of *Truth*), who, in a witty speech, questioned the value of modern high-power salesmanship courses. He was convinced that the science of salesmanship was to know the psychology of the customer. In referring to the Association's benevolent fund he said that no life was more precarious than that of the commercial traveller, and the Association must have been like a sheet anchor to relatives of many travellers in time of need.

Mr. W. H. Williams, the president, in reply, said that the Association had a great tradition to maintain in a wonderful industry. The members were united for the industry, united in good fellowship and were bound by benevolence.

Mr. W. J. Jones proposed the toast of the guests and Mr. Michael Romain responded. The toast of the chairman was proposed by Mr. L. A. Fickling, and Mr. Watson, in a brief reply, thanked the Committee and officers of the Association for their support.

The appeal for the Association's charities resulted in a collection of £141.

Birmingham Electric Club

THE wide scope of the activities of the Birmingham Electric Club and the high esteem with which the organization is regarded were apparent at the annual dinner held at the Grand Hotel, Birmingham, last Friday.

Proposing the toast of the Club, the Lord Mayor of Birmingham, Alderman R. C. Yates, J.P., mentioned that it would be celebrating its golden jubilee in 1954 and now had 650 members. In response the president, Mr. G. F. Peirson, who attended the function despite recent illness, said that the Club was the largest of its kind in the world, its members representing the manufacturing and contracting industries, electricity supply and many other branches of public service.

Replying to the toast of "The Guests" proposed by Mr. G. R. Stone, senior vice-president of the Club, Sir Henry Self, deputy chairman of the British Electricity Authority, said that the electrical industry, comprising manufacturers, industrialists and suppliers of electricity, were indissolubly united in one family and stood or fell by each other. Referring to the appointment of Mr. H. M. Fricke as junior vice-president, the president said that this was the last occasion on which he would act as hon. social secretary. The Club expressed its appreciation of his work and Mr. Fricke briefly replied.

B.E.A. Contracts

DURING the past month, the British Electricity Authority has placed contracts for equipment for power stations, transforming stations, and transmission lines amounting in the aggregate to £10,764,167. The principal contracts include the following:—

Brunswick Wharf power station: One 60 MW turbo-generator, feed heating and condensing plant.—Metropolitan-Vickers; and 3,300 V switchgear.—English Electric Co. Marchwood station, near Southampton: Two 60 MW turbo-generators.—British Thomson-Houston Co.; and generator transformers.—Ferranti. East Yelland station, near Barnstaple: Condensing plant.—G. & J. Weir. Portishead "B" station, near Bristol: Circulating water screens.—F. W. Brackett & Co. Castle Donington station, near Derby: Generator transformer.—Metropolitan-Vickers. Drakelow station, Burton-on-Trent: Ash-handling plant.—International Combustion.

Northampton station: One 30 MW turbo-generator, feed heating and condensing plant.—Brush Electrical Engineering Co. Nottingham station: One 60 MW turbo-generator.—Metropolitan-Vickers. Hams Hall "C" station, Birmingham: Condensing and feed heating plant for three 60 MW turbo-generator sets.—Worthington-Simpson; and transformers.—General Electric Co. Walsall station: Twelve 150,000 lb/hr boilers.—Babcock & Wilcox. Carmarthen Bay station, Burry Port: 132 kV switch-house steelwork.—Balfour, Beatty & Co. Connah's Quay station, near Flint: Ash and dust handling plant.—International Combustion.

Ince station, near Ellesmere Port: Two 60 MW turbo-generators.—G.E.C.; and 3,300 kV and 415 V auxiliary switchgear.—English Electric Co. Skelton Grange station, Leeds: One 60 MW turbo-generator, feed heating and condensing plant.—C. A. Parsons & Co.; 132 kV generator transformers.—Hackbridge & Hewittic Electric Co.; and steel frame for boiler house, precipitator bay and turbine house operating floor.—Dorman Long & Co. Thornhill station, near Dewsbury: One 200,000 lb/hr boiler.—Mitchell Engineering. North Tees "C" station, Middlesbrough: Lighting, heating and plug point installation.—Watson-Norie, Ltd. Stella South station, near Newcastle-upon-Tyne: Coal-handling plant.—Robert Dempster & Sons. Carrington station, near Manchester: Civil engineering works.—A. Monk & Co. Huncoat station, Accrington: Condensing and feed heating plant for two 30 MW turbo-generators.—Hick Hargreaves & Co. Deptford power station and Wimbledon substation: 66 kV, 33 kV and auxiliary cables.—Railway Executive.

Sundon substation, Beds.: 132 kV 2,500 MVA switchgear.—English Electric Co. Rayleigh-Chelmsford-Braintree: 132 kV overhead line.—Watsham's, Ltd. Shirley substation, Warwick: Two 30 MVA, 120·7/11 kV transformers and earthing transformers.—British Electric Transformer Co. Felinfoed-Ammanford-Ystradgynlais, South Wales: 132 kV overhead lines.—B.I. Callender's Construction Co. Creyke Beck substation, Yorks: 132 kV 2,500 MVA switchgear.—A. Reyrolle & Co.; and 30 MVA 132/22 kV and auxiliary transformers.—Ferranti.

Commerce and Industry

Australian Import Cuts

Unusual Lighting-Heating Installation

It was announced in Canberra on 8th March by Mr. Menzies, the Australian Prime Minister, that as an emergency measure, needed to secure a balance in Australia's economy, it was proposed to make a substantial reduction in imports both from dollar sources and the sterling area. Goods would be divided into three classes. The first two would comprise mainly "consumer" goods. Category "A" imports would be restricted to 60 per cent of the value of orders placed during 1950–51 and would include, among other items, steel tubes, telegraph and telephone handsets, switchboards and automobile batteries. Category "B" imports would be reduced to 20 per cent of the 1950–51 value; this class would include refrigerators, floor polishers, washing machines, dish washers, electric fans and radio receivers.

Industrial machinery, including boilers and steam turbines, electrical control gear, etc., which were essential for development, could not be dealt with on a quota basis and would be handled administratively.

Mr. Menzies promised that the restrictions would be removed as soon as conditions permitted.

Organized Visits to B.I.F.

As before, the management of the Castle Bromwich (Birmingham) Section of the British Industries Fair is making arrangements for the admission, at 1s 6d per head, of organized parties of not fewer than twenty people on Saturday, 10th May. Tickets must be obtained in advance and refunds will be made in respect of unused tickets in excess of twenty from the General Manager, B.I.F., Birmingham Chamber of Commerce, 95, New Street, Birmingham, 2.

Belgian Electrical Exhibition

A Thermal Electric Power Stations Exhibition is to form part of the fourth Liège International Fair to be held from 26th April to 11th May. This exhibition will include a wide selection of material suitable for the requirements of the electrical development programmes adopted in many countries. The exhibition has been planned in connection with the opening of the power station at Les Awirs, said to be the greatest achievement in Belgium's production and distribution system and part of a great interconnected network. The exhibition has been planned to coincide with a three-day conference, organized by the Society of Electrical Engineers, graduates of the Montefiore Electrotechnical Institute, during which discussions will take place on the subject of the maximum use of mined products and auxiliary power stations.

Importance of Cast-Iron

From the Council of Ironfoundry Associations (Crusader House, 14, Pall Mall, London, S.W.1) we have received a copy of a handsome little illustrated booklet entitled "Founded on Fact: An Industry's Service to the Nation" by Basil H. Tripp. It sets out to show (and succeeds in showing) how largely modern civilization depends on cast-iron; indeed the first chapter imagines what would happen if all the cast-iron in use suddenly disintegrated. Other chapters deal with the history of the metal; the processes of the ironfoundry; labour in ironfoundries; research, etc. It concludes with a review of the industry's production in 1950–51 which contains tables of salient statistics. It is stated that the castings for the electrical industry in 1950 (generators, motors, switchgear, etc.) comprised 86,896 tons of grey iron and 8,164 of malleable iron; this was only part of the consumption for the industry participated in other classes included in the tables.

Nickel-Silver Strip

Standard specification B.S.1824 for nickel-silver strip and foil has been issued, as part of a series concerning nickel and its alloys in various forms, to meet the special needs of the telecommunications industries. It lays down the requirements in respect of chemical compositions, temper grades, mechanical properties and tolerances on dimensions as well as the way in which test pieces should be selected and tests carried out. Copies are obtainable from the British Standards Institution, 24, Victoria Street, London, S.W.1, price 2s post free.

Swedish H.F. Furnaces

It is reported from Stockholm that two fully automatic high-frequency furnaces, each of 3,400 kW with a steel-charge capacity of 12 tons and a melting time of two and a half hours, claimed to be the largest of their kind in the world, have recently been taken into use at the Swedish Bofors Works. The installation comprises three identical 12-ton and one 3-ton

furnaces designed and built by the ASEA. Measuring 1,600 mm (over 5ft) in diameter and weighing more than one ton, the 18,000 A coil of each furnace consists of copper tubing which is cooled by 500 litres (110 gall) of water a second. Part of the cooling water, which has a temperature of approximately 70 deg C (158 deg F) after passing the coil, is utilized for the shower-baths in the workers' changing-room. The a.c. at 600 c/s is supplied by two generators and a transformer and is transmitted to the furnaces by means of a "rail" system containing over 40 tons of copper and 170 cables of a total length of 4,000 metres, about 2½ miles.

Isle of Thanet Tax Ruling

In the Chancery Division recently the Isle of Thanet Electric Supply Co., Ltd., sought a declaration that, under the provisions of the Margate, Broadstairs and District Electricity Act, 1937, it had a right to have discharged by the South Eastern Electricity Board its liabilities for income tax arising out of balancing charges made by reason of the sale of the company's undertaking to the Margate, Broadstairs and District Electricity Board.

Mr. Justice Danckwerts, giving judgment, said that the company received a surplus over the written down value of its buildings, plant and machinery of £23,002, which taxed at 9s in the £ attracted a liability to further income tax of £10,486. The balancing charges arose by reason of the purchase price including a sum which exceeded the written down value of the buildings, plant and machinery. That sum of money becoming payable to the company was an event which caused the liability to additional tax and it seemed that the event must precede the liability to tax. The liability one to pay tax was subsequent to the moment on the same day when the liability of the purchasing authority to discharge liabilities for sums due from the company had arisen. Accordingly, he held that the liability to pay the tax was not one to be discharged by the Board. He allowed the Board its costs.

Electricity Supply Handbook

The fifth edition of the "Electricity Supply Handbook," now available from the *Electrical Times*, Sardinia House, Sardinia Street, London, W.C.2, comprises 172 pages compared with 152 pages in the last edition. A useful addition to the handbook is a table of supply voltages in an alphabetical list of towns; the appropriate Area Board is indicated in each case. Standard domestic tariffs are also given.

As in the last edition, details of personnel of the Boards are included together with lists of service centres, data relating to Electricity Areas, numbers of consumers, kWh sold, etc. The whole text has been completely revised and the price of this new edition is 5s.

Combined Lighting and Heating

An experimental combined unit for providing indirect lighting and radiant heat is being tried out by the Midlands Electricity Board. It is claimed that this design is particularly suitable for halls or rooms not continuously occupied, which may be required at short notice, because the full reflected heat is available in a few seconds. A much smaller unit has been designed for small rooms, and where such a unit is appropriate it should save considerable expense on the installation, since only one circuit is needed from the switch at the door to the lighting/heating fitting, the heater being separately switched on the fitting itself.

The overall dimensions of the larger fittings (illustrated) are 4ft by 1ft 9in by 5in deep, and the heating is provided by six 1 kW pencil type elements switched in pairs. These fittings are mounted 9ft above floor level and the indirect lighting is provided by six 100 W metal filament lamps. The smaller fitting measures 1ft 6in by 12in by 2in; it is

Combined lighting-heating fittings

rectangular with rounded corners and is constructed of highly polished corrugated metal. In the case the indirect lighting is provided by two 60 W m.f. lamps and the heating by one 1 kW element.

The lights can be switched on without the heat, but the heat cannot be switched on without the light. The "psychological" effect of the warm-looking indirect lighting adds to the comfort of the room.

The light underside of the fitting is ripple glass, but this is not intended to provide the main lighting, which comes from "Silverlite" lamps on the top of the fitting and is reflected from the ceiling. Fluorescent lamps are not considered necessary in rooms not regularly occupied, because in the winter, for example, if lighting is required it is highly probable that heating is also required and the heat which comes from the tungsten filament lamps is not wasted.

Electrical Fatalities

At an inquest at Manchester on a 75-year-old man who was fatally burned, the coroner, after examining the radiator concerned, said he had never seen "such a dangerous contraption for domestic use." One of the elements and three of the guard wires had gone, the back had disappeared, and fittings were exposed which could be touched by anyone moving the fire. It was said that the fire had been bought from a second-hand dealer for a few pence.

The managing director of a firm of haulage contractors received a fatal shock while using an electric drill. At the inquest at Beckenham the coroner said that the drill had been installed in an amateurish way by deceased; the machine itself was in good condition. Evidence showed that there were three lengths of flex between the power point and the drill. The earth wire was not connected and could have touched one of the other wires, causing the drill to become "alive."

Two recent fatal accidents in bathrooms were caused by electric fires. At Wigan, a housewife was found dead in her bath into which an electric fire had fallen, apparently from the side of the bath. In the second case, a Catford man was killed when adjusting an electric fire while he was standing in a bath.

Domestic Science Scholarships

The Caroline Haslett Trust announces the award of five more scholarships to girls who, after their training at domestic science colleges, will make their career in the electrical industry. The awards have been made to Miss Audrey Boon (Burgh Castle, nr. Gt. Yarmouth), Miss Gillian Mathison (Stourport-on-Severn, Worcs), Miss Marian Mellor (Wormhill, nr. Buxton), Miss Brenda Wright (Bolton, Lancs), and Miss Judith Wright (Burton-on-Trent). Scholarships awarded in 1950 and 1951 are tenable at Domestic Science Colleges at Bath, Edinburgh, Gloucester, Leeds, Liverpool, Leicester, and in London at Battersea Polytechnic, King's College of Household and Social Science, the National Society's Training College of Domestic Subjects, Berridge House, and the National Training College of Domestic Subjects, Buckingham Palace Road.

Representation in Italy

Mr. L. Morasso is visiting the United Kingdom during April to June and is desirous of meeting manufacturers of hardware and domestic electrical appliances wishing to export their products to Italy. Communications should be addressed to Mr. Morasso, c/o Agron, Ltd., 14–18, Queen Victoria Street, London, E.C.4.

Prices of Materials

In the accompanying table we give the prices of the more important materials used in the electrical industry. The figures are those quoted on Monday last.

ALUMINIUM Ingots	ton £148 0s 0d
COPPER, H.C. Electro	ton £227 0s 0d
Fire Refined 99·7 per cent	ton £226 0s 0d
Fire Refined 99·2 per cent	ton £225 10s 0d
COPPER Tubes	lb.2s 2d
Sheet	ton £280 0s 0d
H.C. wire and strip	ton £254 0s 0d
LEAD, English	ton £171 10s 0d
Foreign	ton £170 0s 0d
MERCURY	flask £73 10s 0d
TIN	ton £982 0s 0d
ZINC, G.O.B. Foreign	ton £190 0s 0d
Electrolytic	ton £194 0s 0d
BRASS Tubes	lb 2s 1d
Sheet	lb 2s 4½d
Wire	lb 2s 7¾d
PHOSPHOR BRONZE	
Wire	lb 3s 7½d
RUBBER, No. 1 R.S.S. spot	lb 32½d–32¾d

E.C.A. South Staffordshire Branch

Appeals to manufacturers and wholesalers to distribute goods through the proper channels and to the nationalized electricity supply industry to keep to its special duties were made by Mr. I. N. Watkins, president of the Electrical Contractors' Association, speaking at the annual dinner of the South Staffordshire Branch at Wolverhampton on Thursday night.

Mr. Watkins, who was responding to a toast to the Association proposed by the Mayor of Wolverhampton (Councillor J. Beattie), said their industry was large enough to accommodate all its various sections. There was no need for selfishness and grabbing. The special functions of the B.E.A. and the Area Boards were to produce cheaper and more abundant electricity and they should leave to the contractor his legitimate sphere of installation work and the retailing of electrical goods to the public. This overlapping selfishness was not good for the electrical industry. The industry could not afford it for it was diverting the efforts and energies of the various sections on

to the wrong lines. If the industry could not afford it, nor could the country.

The Mayor, in proposing the toast, had praised the Association for its three aims of protecting the public, requiring a high standard of work from its members and expecting from them a high standard of ethics. Other speakers were the Branch chairman, Mr. W. M. Cottrill, who proposed a toast to the guests, and Mr. W. M. B. Furniss (Electric Construction Co.), who replied.

E.A.W. Newcastle Branch Jubilee

In proposing the toast of the Electrical Association for Women at the Silver Jubilee dinner of the Newcastle-on-Tyne Branch on 29th February, Major Gwilym Lloyd George, M.P., Minister of Food, expressed appreciation of the work of the Association in many directions, not only with the Ministry of Food, and he also referred to his personal contacts when he was Minister of Fuel and Power. Dame Caroline Haslett, E.A.W. Director, replied. The Branch toast was proposed by the Lord Mayor of Newcastle, Ald. W. McKeag, and the response was made by Miss N. Balls, chairman of the Branch. The toast of the guests was proposed by Mrs. F. M. Mallinson, Branch vice-chairman, and the reply was given by Mr. H. H. Mullens, chairman, North Eastern Electricity Board. Lady Headlam, Branch president, was in the chair. To mark the occasion, A. Reyrolle & Co., Ltd., entertained Dame Caroline and the Branch Committee at a luncheon and tour of the works. They were received by Mr. J. C. Arkless, Mr. L. E. Mold, and Mr. C. A. Stephens, directors of the company. Tea was taken with the Lord Mayor at the Mansion House.

Brush-Aboe Arrangements

Following the company's reconstruction as the selling organization of the Brush-Aboe group for the larger marine engine market, Associated British Oil Engines (Marine) is now operating on behalf of the marine products of J. & H. McLaren, Ltd., Mirrlees, Bickerton & Day, Ltd., the National Gas & Oil Engine Co., and Widdops of Keighley.

Aboe (Scotland), Ltd., has been renamed Brush Aboe (Scotland), Ltd., with registered offices at Wishaw. A new company, Brush Aboe (Ireland), Ltd., has been formed with registered offices at 195, Pearse Street, Dublin, C.5.

Trade Announcements

Mr. W. F. Valentine, who has been sales representative in the Eastern Counties for **E. K. Cole, Ltd.**, for several years, has now taken over the Warwickshire Area. Mr. W. E. Mills, who has been with Ekco for eighteen years, has been appointed sales representative for the Eastern Counties.

As from 1st March **British Physical Laboratories,** Houseboat Works, Radlett, Herts., have acquired the meter department of the Bryce Electric Construction Co., Ltd. The production of their range of switchboard meters, current transformers and speed indicators is being carried on as before.

Cayson Electrics, Ltd., of Watford, manufacturers of fluorescent control gear, transformers, etc., have a new London office and showrooms at Angel House, Pentonville Road, The Angel, Islington, N.1 (telephone: Terminus 0566).

Ferranti, Ltd., announce that Mr. E. Murray, formerly on the sales staff of their Edinburgh factory, is now representing their radio and television interests in Scotland with Mr. G. L. Cowan. Mr. Murray's territory will be Aberdeen, Angus, Banff, Caithness, Clackmannanshire, Fife, Inverness, Kincardine, Kinross, Lanark (excluding Glasgow), Midlothian (excluding Edinburgh), Moray, Nairn, Orkney, Perth, Ross and Cromarty, Shetland, Stirling, Sutherland and West Lothian. Mr. Cowan's territory in future will be the remainder of Scotland including Edinburgh and Glasgow. The territory of Mr. F. L. Williams which formerly included the South and South West of Scotland, will now end at the Border. His territory in the Northern Counties of England remains unchanged. Mr. Murray's address is 15, Craigleith Hill Avenue, Edinburgh, 4. Mr. Cowan's address is 99, High Street, North Berwick, East Lothian.

Catalogues and Lists

Doran Instrument Co., Ltd., Stroud, Glos.—Illustrated leaflet on resistance boxes and bridges (list 108).

Linolite, Ltd., 118, Baker Street, London, W.1.—Illustrated leaflets on signs and reflectors together with current price list.

Information Department

THE extensive records of our Information Department enable us to reply to most queries, but occasionally we ask our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the makers of the following:—

"Hartroy" white opal lighting fittings.

General inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by the Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Transformer Maintenance

Methods Employed at Hull

About 100 transformers a year are dealt with in the Hull transformer inspection and maintenance department

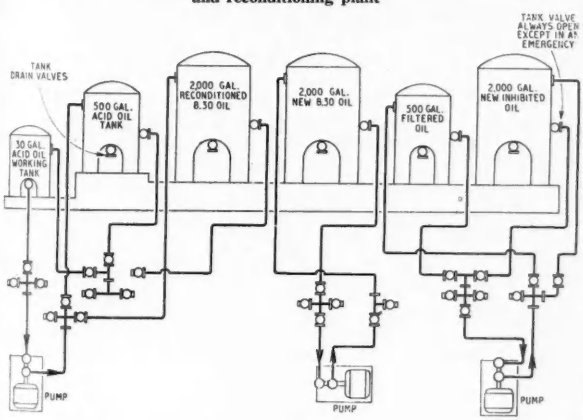
So reliable is the modern power transformer that there is a tendency to take its continued good service for granted. A regular programme of routine inspection and maintenance is, however, of the greatest importance in detecting incipient faults and rectifying them before serious troubles develop.

The Hull Sub-Area of the Yorkshire Electricity Board is particularly active in this direction. In the 1,140 sq miles of the Sub-Area there are about 1,300 transformers of all sizes up to 15,000 kVA. The majority of these are normally tested twice a year, but if the acid content of the oil shows a tendency to rise, tests are increased to four times a year.

Small increases in the acid content are dealt with by inserting bags of activated alumina in the oil. If, however, the acidity neutralization value of the oil exceeds 1 mg KOH/gramme of oil the transformer is taken out of service and the oil is changed.

In the Hull transformer inspection and maintenance department about 100 transformers of all sizes up to 1,000 kVA capacity are handled every year, the larger ones being dealt with on site. Although facilities are not available for re-winding the coils, all other types of repairs can be undertaken. In the simple case of changing the oil, the transformer is taken from its tank, washed down, replaced and the tank is refilled with either inhibited or B.30 oil. In the event of B.30 oil being used, bags of activated alumina are inserted for neutralizing any remaining acid.

Arrangement of tanks and pumps for the proposed new oil storage and reconditioning plant


TANK VALVE ALWAYS OPEN EXCEPT IN AN EMERGENCY
TANK DRAIN VALVES
30 GAL. ACID OIL WORKING TANK
500 GAL. ACID OIL TANK
2,000 GAL. RECONDITIONED B.30 OIL
2,000 GAL. NEW B.30 OIL
500 GAL. FILTERED OIL
2,000 GAL. NEW INHIBITED OIL
PUMP
PUMP
PUMP

Shortly a new oil storage and reconditioning plant, which is to be installed by

the Metafiltration Co., Ltd., will greatly facilitate the work. It will comprise storage capacity for 2,000 gall each of new B.30, reconditioned B.30 and new inhibited oil, and 500 gall each of filtered inhibited and acid oil. Small quantities of oil of low acid content will be reconditioned in a 30 gall working tank containing activated alumina, the latter being reactivated after use.

Three electrically driven pumps in conjunction with a system of 25 numbered hand-operated valves will enable any desired transfer of oil from one tank to another or any particular oil to be delivered at a moment's notice. All operations will be controlled from a central point, remote indicators showing the depth in the tanks.

Besides making it possible to recondition small quantities of oil at well below the cost of new oil, the new plant will enable oil to be bought in bulk instead of in drums with an appreciable saving in cost. Moreover, much less storage space will be needed and the labour involved in the handling and maintenance of the drums will be reduced.

Distant "Load Shed" Switching

Tripping Scattered Feeders Simultaneously

By S. A. DAINES, A.M.I.E.E.*

WITHIN an extensive distribution system it is impracticable to disconnect, almost simultaneously, individual feeders at various distant substations without some form of "remote" actuation.

To restrict to an economical limit the number of tripping channels used exclusively for this purpose, it will be found that the allocation of each channel to a group of feeders is essential. The grouping will, of course, depend upon the geographical schedule for the day-to-day load shedding rota.

In the Bedford District of the Eastern Electricity Board's area a ripple control system (which has existed for some years for different purposes) has been applied to the tripping of circuit breakers in substations too far away to permit of the engineering staff travelling by car and manually tripping the feeders within the short time limit imposed by the control centre at peak load periods.

On feeder switches protected by normal overcurrent or similar relays, the ripple relay (on receiving the signal over the power network) bridges by the operation of its internal switch the protective relay contacts, thus tripping the circuit breaker by means of the d.c. shunt trip coil.

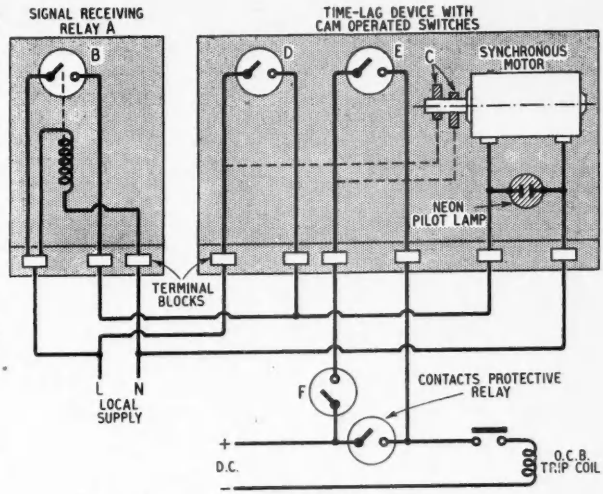
Care was necessary in certain substations to ensure, where the local transformer switch was among those to be tripped, that it would be in fact the last to trip. It was essential that the local supply should be maintained until the other feeder switches within the substation had operated, otherwise it would have been possible, under certain circumstances, for the internal a.c. supply of the substation to be disconnected before the receiving relays on the remaining feeders had picked up the signal.

The time-lag device for the tripping of the local oil circuit breaker was constructed as shown in the diagram, from surplus equipment on hand. Signal receiving relay A operates non-locking switch contacts B which start to drive, by way of the local low voltage supply, the synchronous motor and its associated 4 r.p.m. cams C which eccentrically operate contacts D and E. Contacts D then take over the a.c. supply to the motor before completion of the ripple signal, after which contacts B remain open. After a few seconds contacts E are made and the local transformer's oil circuit breaker is tripped. While the synchronous motor is running the pilot lamp is alight, but after the a.c. supply becomes

* Chilterns Sub-Area, Eastern Electricity Board.

disconnected the motor stops in its uncompleted run and the pilot lamp is then extinguished.

When the circuit breaker is later required to be closed manually it is necessary first to open switch F and then to switch in the oil circuit breaker, when the synchronous motor will continue its run, the pilot lamp meanwhile indicating by finally becoming "dead" that the motor has completed its run. As a final operation, switch F is closed.



Wiring diagram of distant "load shed" tripping apparatus

Other substations have circuit breakers controlled by direct acting a.c. trips; experiments showed that the most efficient way of tripping those breakers was to mount externally an additional 2 A trip coil with its plunger acting on the existing trip lever. By this method interference with the normal protection was avoided.

In these cases the receiving relay control switch, on receipt of the signal, completes a circuit consisting of a loading resistance (producing approximately 4 A) and the external trip coil connected through the local a.c. low voltage supply. Where a short time lag was required the d.c. circuit shown in the diagram was replaced by an a.c. supply, loading resistance, external trip coil and switch F (which is normally closed, but opened in order to close the oil circuit breaker) all in series with the controlling contacts E.

From tests made it has been ascertained that the distant circuit breakers are tripped within one minute of pressing the push-button at the ripple transmitter, situated in proximity to the central power station control room. Previously engineers had to travel up to 10 miles to some substations or, alternatively, had to stand by at the substation waiting for a telephone message on those days when load shedding was likely.

Acknowledgment is made to Mr. P. G. Campling, manager, Chilterns Sub-Area, Eastern Electricity Board, for permission to publish the data given.

Sheffield's Tramways

RECENTLY the Sheffield Corporation adopted a plan for the replacement of the city's tramways by motor omnibuses during the next fifteen years. This decision is contested by the Sheffield Tramways Development Association which has presented a petition to the Minister of Transport asking him to use his influence to prevent the replacement being carried out. The petition was accompanied by a report setting out the case for the retention and improvement of the tramways. This sets out to show that whereas the figures presented to the Corporation showed an advantage in substituting buses for trams, calculations on what the Association considers to be the proper bases prove the reverse.

It is held that, so far from easing traffic congestion, the change would worsen it and accidents would increase. The arguments in favour of tramways presented to the Corporation were incomplete; a number of additional factors which make tramways more advantageous than buses are set out.

Copies of the report (2s 6d) can be obtained from the Association at 111, Button Hill, Sheffield, 11.

MANUFACTURING PROGRESS—1951

Metropolitan-Vickers Electrical Co., Ltd.

AMONG Metropolitan-Vickers steam turbo-alternators commissioned by the B.E.A. in 1951 were the third and fourth 52·5 MW sets at Croydon, one of 60 MW at Battersea "B," the second 50 MW set at Poole and the first of three 31·5 MW sets at Prince's Rock, Plymouth. The turbine at Battersea operates under steam conditions of 1,350 lb/sq in and 950 deg F, and the generator is hydrogen cooled.

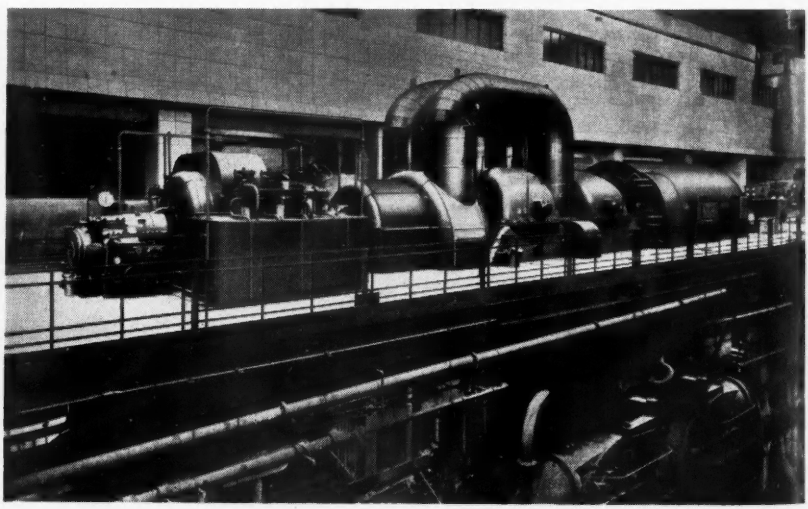
Overseas shipments included the third of four 50 MW sets for Pyrmont power station, Sydney. To Australia also went the first of three 30 MW sets for the Morwell briquetting plant in Victoria, while the sixth 30 MW set was despatched for the Vaal power station, South Africa.

Orders received for turbo-generators represent a total generating capacity of about 1·5 million kW. Of these, three for Castle Donington and one for Battersea "B" will be rated at 100 MW each. Three 60 MW sets are for Portishead "B," two for Carrington and two for Chadderton. Two 52·5 MW sets and one 51·5 MW set are for Brunswick Wharf and Clarence Dock, respectively. The turbines of the Castle Donington sets will be single-axis two-cylinder machines for operation at 1,500 lb/sq in and 1,050 deg F. The erection of the 15 MW gas-turbo-generator for the Trafford power station was so far advanced that it is likely to be commissioned this year.

Large waterwheel generators which were sent to hydro-electric stations overseas included two Pelton-wheel sets, one a 14,100 kVA vertical shaft unit for Mayar, Madras, and the other a 32,000 kVA horizontal double overhung set for Vila Nova, Portugal. Orders were received for two 37,500 kVA and two 62,500 kVA horizontal shaft machines for the Aura station in Norway, and four more 17,778 kVA vertical generators for the Kiewa scheme.

The construction of the 120 kVA 440 V fully automatic generator for the

The turbine of the 60 MW set at Battersea "B" operates under steam conditions of 1,350 lb/sq in and 950 deg F; hydrogen cooled alternator



experimental wind-power scheme in North Scotland was well forward. Among private generating plant in hand were four pass-out sets for the I.C.I. Wilton works where the first will soon be in commission. I.C.I. has also ordered a 12,500 kW condensing unit and a 5,400 kW back-pressure set. A 7,500 kW set is to go to Wankie colliery in Rhodesia. Diesel generating plant activities include a contract for a small power station in Greece, which also covers the h.v. and l.v. switchgear and transformers.

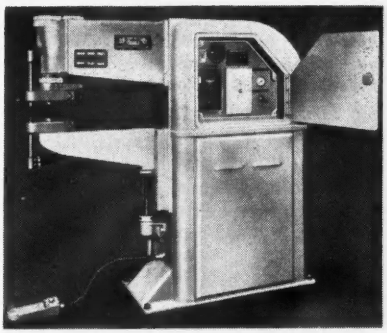
Among transformer developments was a 120 MVA three-phase 13·8/145 kV generator transformer for Castle Donington which is believed to be the largest so far ordered for the grid. It will be equipped for on-load tap changing, with 18 steps on the h.v. windings.

Of overseas transformer orders in hand perhaps the most notable is that for three 75 MVA 15/241 kV three-phase transformer groups for Spain for direct connection to waterwheel generators. They will have off-circuit h.v. tappings for ± 12 kV.

Investigations were carried out on the design of generator and transmission transformers for system voltages up to 400 kV. A 275 kV outdoor current transformer of the post type was developed in collaboration with other manufacturers, and a prototype was constructed for use on the B.E.A. 275 kV system.

The following were some of the principal features of the company's heavy switchgear work. Indoor equipment: eighteen duplicate busbar 66 kV 2,500 MVA equipments under erection at Bankside; 33 kV 1,500 MVA switchboards commissioned at Agecroft and similar ones under assembly at Plymouth "B"; thirty-one 33 kV 750 MVA units ordered for Newport "A" power station, near Melbourne; twenty-one 3,500 MVA 132 kV air-blast circuit breakers under construction for Uskmouth; eighteen 44 kV oil circuit breakers ordered for the Rosherville system in South Africa.

Outdoor gear: eight newly designed air-blast circuit breakers are being made for the new 275 kV system; fourteen 132 kV 3,500 MVA air-blast circuit breakers are in production for Carrington power station; a 165 kV switching station with eight air-blast breakers has been commissioned at the Castelo do Bode hydro-electric station in Portugal, and three similar equipments were in hand for Cabril on the same system; at Fremantle, Western Australia, the 66 kV breakers have been erected; twelve 132 kV 2,500 MVA bulk oil circuit breakers ordered for Clyde's Mill station will have 1,200 A busbars provided with "harmonic restraint" protection; seven 84 kV 400 A circuit breakers were ordered for the Central Railway of Brazil. A new 66 kV outdoor oil circuit breaker under production is a dead tank unit of exceptionally low oil volume and is designed to give a breaking time of five cycles. It can be shipped in one piece and requires no adjustment on site.



This new air operated individual spot welder can also be used for stitch welding

Of the many large industrial motors installed is one of 7,000 h.p. driving a compressor in an experimental wind tunnel. An example of many motors on order which will have closed air circuits and water cooled air coolers is a 1,550 h.p. 6·6 kV synchronous induction machine for driving a sinter plant fan, a 1,550 h.p. 11 kV s.r. motor, and 800 h.p. 6·6 kV high torque s.c. motors for the direct-on-line starting of pumps in South Africa.

Most of the large d.c. machines produced or on order consist of motors and generators for rolling mills and mine winders. A 4,000 V 0/50/120 r.p.m. 800 V roughing mill motor has a peak rating of 10,000 h.p. and is fed from two 1,600 kW motor generator flywheel sets. Winder motors on order include two 2,250 h.p. 660 V 450/0/450 r.p.m. geared motors supplied from two 1,650 kW 500 r.p.m. generators.

Among the medium and smaller ranges of motors there seem to have been particular calls for a.c. flameproof equipments for collieries and oil refineries and

d.c. steelworks auxiliary motors. The totally enclosed motor with a closed air circuit, for use on a printing press with little headroom, was modified by mounting the usual top and bottom radiators on the sides of the motor and the terminal box on the outside of the bracket at the non-driving end; thus the overall height was reduced by 9in.

In connection with industrial driving there was a continuing tendency towards centralized control of an increasing number of motor drives, necessitating intricate schemes of sequence interlocking. Electronic control gained ground for difficult problems like the processing of continuous strip material—steel, paper, rubber and plastics—and the use of thyratrons was adapted both to direct automatic voltage control and to generator field control in Ward-Leonard schemes. Ward-Leonard control seems to have been favoured for machine tool drives requiring selective variable speeds, and nearly a hundred equipments were being made for controlling the table motions of planers.

Welding developments include a new "Thermac" transformer (1,000 A air cooled moving coil), primarily for supplying automatic welding machines, and a new resistance welding machine which is in the form of an air operated individual spot welder, but it can also be used for stitch welding. It is automatic in operation once the controls have been set up.

It is probably reasonable to regard induction equipment as of the greatest interest in industrial heating; orders included equipment for operation at frequencies from 50 c/s to the radio frequencies in the region of 600 kc/s. In a new heating inductor the difficulties of constructing a coil consisting of a helix of several conductors in parallel were overcome and the usual steep slope at the coil ends avoided. Eight h.f. m.g. sets were completed, including one of 1,250 kW, 1,050 c/s, and two of 150 kW, 10,000 c/s.

Brook Motors, Ltd.

EXPORTS of electric motors and control gear by Brook Motors, Ltd., reached record levels last year; direct exports of motors were 35 per cent of the total output of 280,000 units, while a further 40 per cent was exported as incorporated drives in British-made machinery of all kinds.

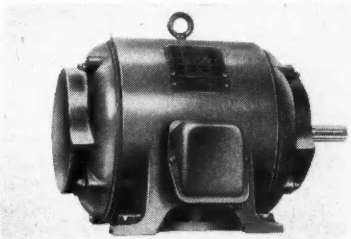
Australia made extensive purchases of motors in her efforts to keep pace with such expanding industries as fruit canning, sugar refining and production of refrigeration equipment. To New South Wales alone 9,000 motors (nearly 60,000 h.p.) were delivered. Over 100 motors, totalling 1,500 h.p., were supplied to the Australian aluminium industry and business in Western Australia was greatly increased. New Zealand took new plant for the meat industries and motors and control gear for a large paint factory.

"Brema" type motors brought more dollar business from the Americas, proving that British electric motors can be competitive in these markets.

South African sales have again risen since the relaxation of import controls, and the Rhodesias, with their newly found mineral deposits, promise extensive future requirements. Brook business with the rest of the African continent, Kenya, Tanganyika, British West Africa, Portuguese Colonies, Angola, Mozambique, Egypt and the Sudan also showed some expansion.

In spite of many troubled areas in Asia, this vast continent is increasing its motor imports. Pakistan, Malaya, Burma, Ceylon, Iraq, Syria, Lebanon and Israel have all purchased the company's equipment. Nearer home, despite keen Continental competition, the European market has been maintained. The Scandinavian countries in particular have taken motors for timber saw mills, pulp mills, the herring oil industry and other allied trades. A motor produced by the company is being used for the ski-hoist at the Olympic Games in Norway.

One of the "Brema" range of motors



Post-Graduate Activities

Collaboration Between Industry and Universities

At an ordinary meeting of the Institution of Electrical Engineers in London last week a paper on post-graduate activities in electrical engineering was presented by Dr. W. J. Gibbs and Messrs. D. Edmundson, R. G. A. Dimmick and G. S. C. Lucas, all of whom are with the British Thomson-Houston Co., Ltd.

The purpose of the paper was to focus attention on the important period following apprenticeship, to review the existing facilities for post-graduate work during this period and to consider the possibilities of still more collaboration between industry and the universities. To develop the theme the authors first of all briefly reviewed the basic education and training of electrical engineers up to the close of apprenticeship, after which the rate of increase in technical staff required to meet the steady expansion of the industry, without lowering standards, was considered. The period following apprenticeship was of vital importance for it was then that the engineer should begin to develop creative power. The creative faculty was linked with concentration of effort from which arose the need for specialization.

The authors continued by describing the present post-graduate activities in industry, the universities and technical colleges and in particular the collaboration between their own organization and the local Technical College. Special courses based on industry were described, particularly the advanced engineering course. The authors felt that the close collaboration between industry and the universities and colleges characterizing present activities should be extended to future activities. It was suggested that post-graduate research should be done mainly in industry rather than wholly at the university.

DISCUSSION

In opening the discussion Professor Willis Jackson (Imperial College) announced the institution of a number of engineering research fellowships for award to graduate apprentices of the B.T.H. Co., preferably at the end of the first year of apprenticeship. The fellowships would cover two years post-apprenticeship research into engineering problems of particular long-term interest and importance to the company and the work would be supervised by a staff member of the company.

An attempt would be made to interest an authoritative university staff member in the research and, where desirable, to arrange for appropriate parts of the work to be carried out in the university in question under his guidance. It was hoped that in some cases the young men concerned might be able to proceed to the Ph.D. degree. These arrangements gave promise of resolving such variations in point of view as had existed between the authors and himself and would, he hoped, be a step toward a closer collaboration between the universities and industry.

Speaking of the importance of the step Professor Willis Jackson had announced, Mr. H. West (Metropolitan-Vickers) said that some of the brighter young engineers in South Africa were being sent to America for training. A complaint he had heard was that the apprenticeship system in England did not go far enough; it ended after two years and left the young men "unfinished."

Professor W. A. Tuplin (Sheffield University) agreed that the future of industry depended on the highest possible standard of personnel and said that for each firm this meant making a more marked financial discrimination between mediocre men and outstanding men, and by "outstanding" he meant technically outstanding men, not prominent specialists in industrial politics.

Professor E. B. Moullin (Cambridge University) agreed that the entry of graduates into industry should not be delayed by further college courses, but said that this opinion was not held everywhere. He referred to the White Paper on higher technological education (Cmd.

8357) which spoke very explicitly about first steps toward providing longer courses by encouraging a few universities to institute post-graduate courses of one year's duration. He asked those who were concerned with the contents of the paper to read its introduction side by side with paragraphs 4, 5 and 6 of the White Paper and note how completely contradictory they were.

Mr. H. J. Shelley (Ministry of Education) said that large firms could give excellent opportunities for post-graduate training on a co-operative basis, within their own organizations, but he urged the authors not to forget the many smaller industrial concerns. Could not the colleges do something for them on a full-time basis?

Dr. E. Marsden (New Zealand Government) urged that the best way to use the young men selected for this special training was not to send them into the Forces for two years but to use them in research and development. He complained that many young research men he had sent to the United Kingdom to be trained had had the initiative knocked out of them during the period of apprenticeship and at the end were no use for progressive development work.

Professor F. M. Bruce (Royal Technical College, Glasgow) suggested that they had had considerable success in the past in the traditional methods of training the future fundamental research worker on the lines of the Ph.D. system and he hoped that the system would be continued.

Among the points made by Mr. S. E. Goodall (W. T. Henley's Telegraph Works Co., Ltd.) was that they should encourage transfer from National Certificate courses to university courses. He knew several men who would have benefited if, at an early age, they had been able to transfer from part-time National Certificate courses to full time at a university.

Mr. L. H. A. Carr (Metropolitan-Vickers) said that the practice in America for the last thirty years had been to run advanced engineering courses. University men had at least three years' training in courses like those which they had been discussing. That was the competition this country had to meet; we must follow that example and all our big firms must institute courses similar to those described by the authors.

Mr. A. Draper (Rugby College of Technology) suggested that in the authors' realistic approach to the research problem there should be room for the engineering teacher on the staff of a technical college. There might be ways whereby he could get back into the industry for practical work.

Mr. B. Adkins (City and Guilds) urged collaboration between universities and industry. The universities could help industry to cultivate the sense of detachment which was so important in true research work. Increased contacts with industry would help the university staffs to maintain both research and teaching on a realistic practical plane.

Other speakers were Mr. J. F. Yates (Royal Technical College, Salford), Mr. F. R. Livock (G.E.C.), Mr. M. W. Humphrey Davies (City and Guilds) and Mr. G. R. Slemon (City and Guilds). Speaking on recruitment to the industry from grammar schools and public schools, Mr. Livock said they had still not succeeded in putting across the fact that a career in electrical engineering was something worth while. Perhaps if they trained their technicians better they would need fewer professional engineers. An important point on which little had been said was the fact that military service would continue for many years to come and no scheme of training was complete unless it recognized that fact.

Monopolies Commission

THE third annual report by the Board of Trade on the working of the Monopolies and Restrictive Practices Act, 1948 (H.M. Stationery Office, 6d), covers the calendar year 1951. Seven subjects are now before the Monopolies Commission for investigation, including the supply of insulated electric wires and cables; and the supply of various semi-manufactures of copper and copper-based alloys, and exports of these products from the United Kingdom. During the year the Commission's report of the supply of electric lamps was published. Preliminary discussions have already taken place on the Commission's recommendations between the Electric Lamp Manufacturers' Association and the Ministry of Supply.

A survey of suggestions and requests made to the Board of Trade for reference to the Commission reveals no new items of an electrical character. No mention is made of any further action by the Board in these matters which include (from previous reports) several electrical items such as domestic electrical appliances, starter batteries, heavy electrical equipment and radio valves.

RECENT INTRODUCTIONS

NOTES ON NEW ELECTRICAL AND ALLIED PRODUCTS

Hot-Air Sterilizer

An electrically operated hot-air sterilizer with a chamber measuring 10in by 10in by 18in deep has recently been made available by Surgical Equipment Supplies, Ltd., Westfield Road, Acton, London, W.3. A motor driven fan is fitted to ensure even temperature throughout the chamber which is provided with three deep perforated removable trays thereby making it suitable for the bulk sterilization of syringes. The temperature is thermostatically controlled within a range from 93 deg C to 260 deg C and a pilot light is incorporated to show that the sterilizer is working. The maximum loading of the sterilizer is 1,200 W and it is available either for bench mounting or with a stand. The standard finish is silver grey enamel with all bright parts chromium plated.

Bimetal Thermostat

The dustproof thermostat made by the Mycalex Co., Ltd., Ashcroft Road, Cirencester, Glos, measures only 3¼in by 2⅜in by 2¼in deep. It operates on the bimetal principle and has a range of about 35 deg F while by a simple adjustment this range can be preset to cover any part of the temperature scale from 32 deg F to 150 deg F. It is provided with a dial calibrated in deg F, has a switching capacity of 15 A at 250 V, 40/60 c/s, and is priced at 36s.

Electro-Magnetic Presses

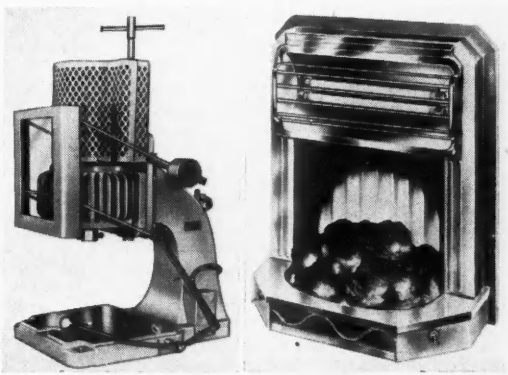
The electro-magnetic presses made by Newton, Lansdown & Co., Ltd., Brook House, 2, Torrington Place, London, W.C.1, can be used for many purposes on the production line. They can carry out 3,600 operations an hour when set for continuous stroking with automatic feed of stock, although this figure will be less when single stroking is employed. As the working period is only 0·1 sec the power consumption is modest. The electro-magnetic operation means that special requirements are small and no special foundations are required since the presses stand on a normal bench. The weight varies according to the type and duty of the "Elmeg" press from 278 lb to 66 lb; the space required ranges from 15·5in by 21·5in to 7·25in by 12in. The units are available as complete presses, as power heads or as portable hand tools.

Drum Truck

The "pick up" drum truck made by Powell & Co., Burry Port, Carmarthenshire, can be used for standard drums and barrels up to 5½ cwt gross weight. By the use of a specially designed sliding hook the operator does not have to touch the drums and they are thus kept clean. A robust all-steel construction has been adopted and the wheels, which are on roller bearings, are fitted with either rubber cushion or pneumatic tyres.

Imitation Coal Fire

A realistic imitation coal effect is achieved in the new "Creda Marlow" fire produced by the Simplex Electric Co., Ltd., Oldbury, Birmingham. It incorporates two 1½ kW rod type elements mounted at the top, and a 60 W coloured lamp can be left on independently of the heating elements to give full glow and flicker effect without heat. The fire, which is finished in old silver, is 25in high, 22in wide and 8in deep. Supplied with 6ft of non-kinking three-core flex, the price of the new fire is £13 4s (plus £9 14s 1d purchase tax in the United Kingdom).



Typical "Elmeg" electro-magnetic press with the guard raised and (right) Simplex "Creda Marlow" fire

ELECTRICITY SUPPLY

First Section of Super-Grid Completed

Industrial Tariffs in North West

THE first section of the British Electricity Authority's new 275 kV super-grid has just been completed between Staythorpe power station, Newark, Notts, and Barnby Moor in Yorkshire. It is the first 275 kV overhead line to be erected in this country and the first to use duplicate conductors. It will reinforce the existing 132 kV national grid system. The single-circuit line, over 20 miles long, was constructed by the British Insulated Callender's Construction Co., Ltd., which had previously designed, supplied and erected an experimental 275/500 kV overhead line at Leatherhead so that the mechanical and electrical problems of overhead transmission at super-voltages could be closely studied.

The completed section of the new system consists of three pairs of standard steel cored aluminium twin conductors and two earth wires carried on waisted-type galvanized steel lattice towers. The twin conductors, kept 12in apart by aluminium spacers and supported by toughened glass insulators, are erected in spans of 1,200ft. The conductor stringing presented difficulty as equal sags of the twin wires had to be maintained. The 99 towers in the section—84 straight line, 14 angle and one terminal—are over 80ft high and were designed by Blaw Knox, Ltd.

Separate Scottish Boards

Under the heading "Scotland Freed of Shackles," the Glasgow *Daily Record and Mail* prints a report from its Lobby Correspondent quoting Mr. James Stuart, Secretary of State for Scotland, as saying that the Government intends to press forward with a big policy of decentralization for Scotland. "It is intended," says the report, "to set up separate boards for coal, electricity and railways. They will act in concert with, but in no way subordinate to, the English boards. A Scottish Gas Commission will be set up responsible to the Secretary for Scotland to return, wherever practicable and desired, the nationalized gas undertakings to local authorities either singly or jointly."

Capital for Rural Development

The Minister of Fuel and Power has informed the Eastern Electricity Consultative Council that he appreciates the importance of electricity as an aid to farming and in improving conditions of country life, and he has given full weight to the representations received from Consultative Councils. Because the country's resources available for capital investment were insufficient to meet all requirements, the level of investment in the electricity industry approved during last year did not provide for new schemes of rural development being started. As a result of the Government's recent review a general allocation had been made to the electricity industry which should enable the Area Boards to continue with rural electrification schemes already in progress and start some urgent new schemes.

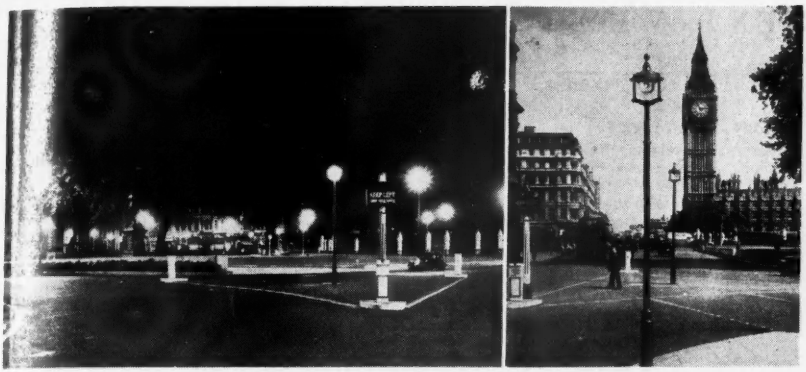
Developments in North East

The North Eastern Electricity Board is carrying out extensive improvements in the N.W. Durham districts of Dipton, South Stanley and Crookgate to cope with the increased demand for electricity. This work is estimated to cost £40,000. The Board is also arranging to provide a 20 kV supply to the Greencroft trading estate at Annfield Plain.

Standard Industrial Tariff

Some 3,000 industrial consumers in the North Western Electricity Board's Area are affected by a new standard tariff which has been agreed with the British Electricity Authority and the North Western Electricity Consultative Council. Announcing the proposed new tariff last week, the Board pointed out that, while tariffs for domestic and certain other consumers had been adjusted twice since vesting day (in 1948 and 1951) to take account of rising costs, industrial tariffs had not been increased, apart from the automatic advance through coal price variation clauses. In fact, in the main they were the same as before the war. The new charges were designed to secure an additional revenue of £1,400,000 per annum, representing an overall average increase of 16 per cent. Because of the disparity in existing rates, however, some consumers would have to meet a considerably greater increase than this.

The new scale of charges will be as follows:—High-voltage supplies to consumer's substation: 11s 6d per kW of maximum demand each month for the first 200 kW, 11s/kW for the next 300, 10s 6d/kW for the next 500 and



Lighting installation in Parliament Square, showing the specially designed fittings

10s/kW above 1,000. Medium voltage supplies: 12s 6d/kW of maximum demand a month. In addition there will be a charge of 0·46d/kWh for the first 200 kWh per kW of maximum demand, 0·42d/kWh for the next 300 kWh and 0·38d/kWh thereafter, subject as at present to variations according to the price of coal, etc.

In a joint statement the Federation of British Industries and the National Union of Manufacturers (North West Region) criticized the secrecy with which the subject had been handled. Owing to the tariffs being marked "private and confidential," it had not been possible for the industrial members of the Consultative Council to have an adequate opportunity of consulting fully with industry. For this reason it had also been impossible to find out the full implications of the new tariffs, but it was known that there were firms which would have to meet increases in cost of from 25 to 50 per cent.

Answering the charge of secrecy, Mr. A. O. Johnson, chief commercial officer of the Board, said that although the documents were marked "private and confidential" members of the Consultative Council were empowered to consult technical advisers who could inform them of the effect. Ald. Wright Robinson, chairman of the Consultative Council, said that before any decision was made he told members that they were at liberty to take such advice as they thought fit, and there was every opportunity of getting to know the full implications of the tariffs.

Lighting in Parliament Square

Fittings and columns for the lighting installation in Parliament Square, Westminster, were specially manufactured by the Revo Electric Co., Ltd., from designs by Mr. Guy Wornum, the architect. For the main road lighting the fittings, designed for use with 1,500 W tungsten lamps, comprise a spun copper canopy with white reflecting surface and internal dome refractor with enclosed well glass. The bronze finished columns are of tubular steel and cast iron and the height to light source is 25ft. Smaller fittings and columns of similar design are used for refuge islands, but in this case the fitting has no refractor and carries two 150 W lamps; the height to light source is 15ft. As will be seen from the photograph, particularly good illumination is provided and the equipment is dignified and unobtrusive. The equipment was erected and installed by the London Electricity Board.

Monmouthshire Power Station Site

A proposal by the British Electricity Authority to build a power station between Rhiwderin and Lower Machen, in Monmouthshire, is criticized by the *South Wales Argus* on grounds of loss of good agricultural land and the effect on the picturesque countryside around the Draethen and Ruperra Castle. It says that four other sites farther north, where the threat to agricultural and amenity values would be less, have been rejected because of the possibility of subsidence. Officials of the B.E.A. have objected to two suggested coastal sites on strategic grounds, and have raised technical objections to another site at Rogerstone. Six local Councils and eight other bodies are said to have announced their opposition to the proposed site. Members of Graig Parish Council have, however, unanimously given their support, the view being taken that the project would be a big asset to the district.

Clyde's Mill Extension

The British Electricity Authority has received the consent of the Ministry of Fuel and Power to the extension of the Clyde's Mill power station, Glasgow, by two 30 MW turbo-alternator sets and four 180,000 lb/hr boilers.

NEXT WEEK'S EVENTS

Monday, 17th March

BIRMINGHAM.—Grand Hotel. Birmingham Electric Club. Annual general meeting. "The Development of Load on an Electricity Supply System," by J. R. Anderson.

BRISTOL.—Electricity House, Colston Avenue, 6 p.m. I.E.E. Western Supply Group. Informal meeting.

LIVERPOOL.—Philharmonic Hall, 6.45 p.m. I.E.E. Mersey and North Wales Centre. Faraday Lecture. "Sound Recording—Home, Professional, Industrial and Scientific Applications," by Dr. G. F. Dutton.

LONDON.—Caxton Hall, S.W.1, 7 p.m. E.P.E.A. London Technical Group. "Commissioning Power House Plant."

NEWCASTLE-ON-TYNE.—King's College, 6.15 p.m. I.E.E. North-Eastern Radio and Measurements Group. Informal lecture by Dr. G. A. V. Sowter.

SHEFFIELD.—The University, Western Bank, 6.30 p.m. I.E.S. Sheffield Centre. "Colour," by W. J. Wellwood Ferguson.

Tuesday, 18th March

LEEDS.—Lighting Service Bureau, 24, Aire Street, 6.30 p.m. I.E.E. North Midland Utilization Group. "The Characteristics and Control of Rectifier-Motor Variable-Speed Drives," by P. Bingley.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Measurements and Supply Sections. Joint meeting. "The Application of Transductors as Relays to Protective Gear," by R. K. Edgley and F. L. Hamilton.

At the Institution of Mechanical Engineers, Storey's Gate, S.W.1, 5.30 p.m. Institute of Fuel. "Fuel, Heat and Power Auditing."

Lighting Service Bureau, 6.30 p.m. Association of Supervising Electrical Engineers. "Statistical Methods as Aids to Efficiency, with special reference to the Presentation of Data on Control Charts," by Dr. B. P. Dudding.

MANCHESTER.—Engineers' Club, Albert Square, 6.15 p.m. I.E.E. North-Western Measurements Group. "A Survey of Modern Methods of Presentation of Instrument Readings and Recordings," by L. B. S. Golds.

NOTTINGHAM.—Gas Showrooms, 6.30 p.m. I.E.E. East Midland Centre. "A Logical Approach to the Problems of Electric Space-Warming," by D. H. Parry.

Wednesday, 19th March

BOURNEMOUTH.—Grand Hotel, 6.30 p.m. I.E.E. Southern Centre. "The Dimming of Low-Pressure Discharge Lamps," by C. E. Williams.

COVENTRY.—Technical College, 7.15 p.m. A.S.E.E. Coventry Branch. "Estimating," by W. H. Brooks.

LONDON.—Savoy Place, W.C.2, 7 p.m. I.E.E. London Students' Section. "Industrial Electronics," by R. A. Jones.

John Adam Street, Adelphi, W.C.2, 2.30 p.m. Royal Society of Arts. "Supplementary Sources of Power—Wind, Tide, Sun and Volcanic Heat," by C. W. Marshall.

Management House, 8, Hill Street, W.1, 7 p.m. Institute of Industrial Administration, London Centre. "Management in Practice, No. 7, How to Achieve Increased Productivity," by Lt.-Col. A. Marriott.

MANCHESTER.—Engineers' Club, Albert Square, 7.30 p.m. A.S.E.E. Manchester Branch. Film show.

SHEFFIELD.—Grand Hotel, 6.30 p.m. I.E.E. Sheffield Sub-Centre. "The Protection of Electrical Power Systems—A Critical Review of Present-day Practice and Recent Progress," by H. Leyburn and C. H. W. Lackey.

Thursday, 20th March

BELFAST.—Sir William Whitla Hall, 6.45 p.m. I.E.E. Northern Ireland Centre. Faraday Lecture. "Sound Recording—Home, Professional, Industrial and Scientific Applications," by Dr. G. F. Dutton.

DUBLIN.—Trinity College, 6 p.m. I.E.E. Irish Branch. "Modulation—Some Fundamental Considerations," by T. P. Allen.

GLASGOW.—I.E.S. Glasgow Centre. Annual general meeting. Presidential address by J. G. Holmes. Annual dinner.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Utilization Section. "The Individual-Generator System as Applied to the Tandem Cold-Strip Mill," by D. Bolton. "The Magnetic-Fluid Clutch," by E. J. R. Hardy. "The Measurement of Electrical Activity in the Human Body," by J. C. Shaw.

Savoy Hotel, W.C.2, 6.30 for 7 p.m. Electrical Wholesalers' Federation. Annual dinner.

Caxton Hall, S.W.1, 2.30 p.m. Diesel Engine Users' Association. "The Internal Combustion Engine from the User's Point of View," by A. K. Bruce.

NEWCASTLE-ON-TYNE.—County Hotel, Neville Street, 5.45 p.m. Engineers' Guild, Northern Branch. "The Tyne Tunnel," by Sir David Anderson.

NORTHAMPTON.—E.P.E.A. Midland Technical Group, 7 p.m. "Electric Motor Construction and Industrial Application."

Friday, 21st March

EDINBURGH.—North British Station Hotel, 7 for 7.30 p.m. I.E.E. Scottish Centre. Annual dinner and visit of Vice-President.

I.E.S., Edinburgh Centre. Annual dinner and social.

GLOUCESTER.—At the G.E.C., St. Aldate Street, 6.15 p.m. I.E.S. Gloucester and Cheltenham Centre. Film show.

HARROGATE.—Majestic Hotel, 7.15 for 8 p.m. I.E.E. North Midland Centre. Annual dinner-dance.

LONDON.—Storey's Gate, S.W.1, 5.30 p.m. Institution of Mechanical Engineers. "Centrifugal Pumps in Steam Power Stations," by R. Pennington.

Connaught Rooms, Great Queen Street, W.C.2, 6 p.m. Ex-British Westinghouse Association. Annual reunion.

NOTTINGHAM.—Victoria Station Hotel. I.E.S. Nottingham Centre. Annual ladies' evening.

SHEFFIELD.—Royal Victoria Hotel. Electrical Industries Benevolent Association, Sheffield Branch. Annual dinner-dance.

FINANCIAL SECTION

Company Notes and Stock Exchange Activities

Reports and Dividends

The English Electric Co., Ltd.—The accounts of this company were dealt with in our last week's issue. In the full report and accounts now issued the directors refer to the acquisition of a factory at Accrington, which was taken over by the company on lease from the Ministry of Supply. Work was also begun during the year on a new factory at Netherton, near Liverpool, the cost of which is being provided jointly by the company and the Ministry of Supply. Except for 56,059 ordinary shares, the whole of the share capital of the company has now been issued. The directors therefore recommend that the authorized capital should be increased to £10,000,000 by the creation of a further 2,000,000 ordinary shares of £1 each. No further issues are at present contemplated.

With the report and accounts the company has issued an elaborate brochure of sixty-four pages illustrating some of the more important contracts carried out by the company and its subsidiaries.

Desoutter Brothers (Holdings), Ltd.—In his statement which accompanies the report and accounts, Mr. E. R. Desoutter (chairman) says that during the course of the year they occupied two new extensions to their factory, one of 12,000 sq ft for production and a smaller one of 5,600 sq ft for storage. Complete deliveries of all the tools required for the new factory extensions will not be obtained before the end of 1953 or even later. They have not, therefore, obtained the full value of these developments during the past year, but their sales have increased by 17 per cent above 1950. The demand for their products has continued to increase very rapidly, both in the home market and for export, and their order book is now fuller than it has ever been before in the history of the company. They are making a substantial contribution to re-armament at home and a very large proportion of their total production is exported to more than fifty countries all over the world; 46 per cent of those exports are to the Sterling-Commonwealth group and over 15 per cent to the dollar group.

Taylor Tunnicliff (Electrical Industries), Ltd.—The financial results for the year ended 31st December last were published in our issue of 29th February. In his statement which accompanies the report and accounts, Col. Sir John Kent (chairman) says that the extension and reconstruction schemes at Stone and Longton are nearing completion, and both these factories have contributed appreciably to the substantial increase in turnover during the year under review. The factories continue to be fully employed and future prospects remain good.

International Combustion (Holdings), Ltd., reports a group trading profit for the year to 30th September last of £1,222,599, as compared with £902,928 for the preceding year, which with other income makes £1,262,338 available. The net profit, after deducting £724,604 for taxation, is £537,734 (against £391,973). The net profit of the holdings company is £507,023 (£131,985). The ordinary dividend for the year, already announced, is 25 per cent (against 20 per cent), general revenue reserve receives £350,000, and the balance carried forward by the holdings company is £185,868 (£149,078 brought in).

British Insulated Callender's Cables, Ltd., has decided to offer 3,109,614 new ordinary shares of £1 each at 22s a share to ordinary stockholders on the basis of one new share for every £3 of ordinary stock held. The offer will leave a small balance of shares for which the ordinary stockholders will also be invited to apply. Holders of the new shares will not participate in any ordinary dividend for the year to 31st December last. Full details of the offer will be circulated to stockholders on 28th March.

The General Electric Co., Ltd.—Acceptances under the recent "rights" offer to ordinary stockholders totalled 90.6 per cent of the 1,679,348 £1 ordinary shares offered. Applications for additional shares were considerably in excess of the balance of shares available and allotments in respect of the larger applications have been heavily scaled down.

The Midland Electric Manufacturing Co., Ltd., reports a net profit for 1951, after charging £199,000 for taxation, of £138,611, as compared with £129,616 for 1950. The dividend for the year is unchanged at 15 per cent.

Ericsson Telephones, Ltd., report a trading profit for 1951, before tax, of £1,009,101, as compared with £1,188,223 for the preceding year. After providing £557,902

for taxation, and placing £20,000 to tax equalization reserve, the net profit is £431,199 (against £532,614), to which is added £213,551 brought in, making £644,750 available. General reserve receives £328,113 and it is proposed to pay a final ordinary dividend of 12 per cent and a bonus of 5 per cent, making 22 per cent, free of tax, for the year (same). The distribution is made on larger capital.

Palestine Electric Corporation, Ltd.—The consent of the British Treasury and of the Israeli Government has now been obtained to the proposed offer to be made by the Corporation for the acquisition of the share capital of the Jerusalem Electric Corporation. The directors, however, are awaiting clarification of the effect of the new currency regulations, which have delayed the issue of details of the offer.

Morphy-Richards, Ltd., have declared an interim dividend of 15 per cent (unchanged) on increased capital.

Stothert & Pitt, Ltd., have declared an unchanged interim dividend of 5 per cent.

New Companies

Gordon Wilson (Wholesale Electric), Ltd.—Registered 27th February. Capital £10,000. Wholesale dealers in and manufacturers and repairers of artificial lighting apparatus, electrical plant and fittings, wireless and television sets, etc. Directors : G. Wilson and K. H. Marsden. Regd. office : 2, Park Road, Blackburn.

McPhail & Meikle, Ltd.—Registered in Edinburgh 26th February. Capital £10,000. To acquire the business of electrical factors, etc., now carried on as " McPhail & Meikle," at Glasgow. Directors : R. L. McPhail, J. Richmond and Mrs. Jessie A. McPhail.

Winding-up Petition

Hale Electric Co., Ltd.—The petition by Harvey (Electrical Engineers), Ltd., for the winding-up of this company will now be heard at the High Court, London, on 17th March, and any person intending to appear on the hearing must notify Mr. L. Fior, 14, Manchester Square, London, W.1, solicitor for the petitioner, by 15th March.

Liquidations

Duncan Mays, Ltd.—Winding up voluntarily. Liquidator, Mr. D. Morgan, 100, Park Street, London, W.1.

Henfrey Electrical, Ltd.—Referring to the note in last week's issue, Mr. H. Freedman asks us to state that this company has no connection with the business of Henfrey Electrical Installations, of which he has been proprietor since 1920.

Bankruptcies

C. R. Boydon, Ivy House, Thorpe Mandeville, Banbury, Oxon., electrical engineer.—Receiving order made 26th February on a creditor's petition.

P. H. Leach, 4, Oxford Street, Guiseley, near Leeds, lately carrying on business at 4, Oxford Street, Guiseley, and 6 and 8, Town Street, Yeadon, Yorks., as a radio and electrical engineer.—Last day for receiving proofs for dividend 21st March. Trustee, Mr. K. Russam, 2a, Tyrrel Street, Bradford, Yorks.

L. E. Lawson, The House Boat " Jean," Sheppards Boat Yard, Saltford, near Bristol, and previously residing and carrying on business at 1, Northam Road, Six Dials, Southampton, under the name of Lawson's Radio, radio and electrical engineer.—Second and final dividend of 6¾d in the £, payable from 12th March at 100, Park Street, Grosvenor Square, London, W.1.

A. J. Martin, lately carrying on business at High Street, Stalham, Norfolk, electrical engineer and wireless dealer.—Receiving order made 28th February on a creditor's petition.

A. Fielder, carrying on business at 314, Shortheath Road, Erdington, Birmingham, and at 4, Cooksey Lane, Erdington, Birmingham, under the style of A. Fielder & Co., radio and electrical retailer.—First dividend of 5s in the £, payable on or after 28th March at the Official Receiver's office, Somerset House, 37, Temple Street, Birmingham, 2.

TRADE MARKS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered up to 27th March.

WELCOLITE. No. 700,003, Class 7. Sets, comprising an electricity generator driven by an internal combustion engine, for domestic lighting purposes.—Welland Engineering Co., Ltd., Water Lane, Spalding, Lincs.

SYNCHRONEL. No. B699,317. ASYNCHRONEL. No. B699,318, Class 9. Electronic control contrivances included in Class 9 for use in cyclical welding operations.—Ateliers de Constructions Electriques de Charleroi, Brussels, Belgium. Address for service, c/o Feeny & Feeny, 2a, Charlwood Place, Westminster, London, S.W.1.

ALTRON (design). No. 702,200, Class 9. Electronic apparatus and instruments included in Class 9, but not including electronic apparatus and instruments for use in radio, television or in aircraft communication equipment or any goods of the same description as any of these excluded goods.—Allied Electronics, Ltd., 28, Upper Richmond Road, Putney, London, S.W.15.

REAFER. No. 703,781, Class 9. Radio receiving sets (complete) and parts included in Class 9 of such goods.—J. M. Wotherspoon & Co., Ltd., 194–200, Bishopsgate, London, E.C.2.

DOWMIC. No. 704,040, Class 9. Electrical switchgear and parts thereof included in Class 9.—Dowty Equipment, Ltd., Arle Court, Cheltenham, Glos.

HEALADEX. No. 702,913. HEALASOL. No. 702,914, Class 9. Electro-medical curative apparatus and appliances.—Heala (Electro Medical), Ltd., Cherry Street, Woking, Surrey.

STOCKS and SHARES

On the eve of the Budget, the Stock Exchange markets which deal with industrial shares were somewhat disturbed by the restrictions that were to be placed upon imports by Australia and, in a more limited manner, by Southern Rhodesia. The decision to cut imports is thought likely to have an unfavourable repercussion upon industrial companies which have been doing substantial export business with Australia, and, as a consequence, prices were lowered, not to any material extent, but in a manner which enabled prospective buyers to get more favourable terms than would-be sellers did. As regards the Budget itself, Stock Exchange markets are now beginning to settle down to the implications of Mr. Butler's proposals, and, with suspense ended, it is anticipated that activity will show at least some improvement upon the dullness that has characterized business in the House.

It may be stated that, from this week, tables of prices will again be given in each issue of the *Electrical Review*, instead of being published only on the first Friday in the month.

I.C.I. and Asset Values

From time to time the public is given a glimpse of the real value of the assets possessed by some of our major industrial enterprises, as opposed to the figures at which their property, plant and so on, stand in their balance sheets. Last year, Imperial Chemical Industries took the notable step of revaluing the manufacturing assets of the group on the basis of present-day construction costs, with appropriate deductions, and by revising the balance-sheet figures accordingly. The decision made a stir, not only as a matter of accounting policy, but because of the magnitude of the surplus so disclosed: it amounted to little short of £100 million. One object of the exercise was to permit the company to assess the amounts required properly to cover depreciation and replacement charges. It served, also, to put the profit figures in their proper perspective against the amount of capital employed in the business. The company achieved a notable success with its new issue, the 10 million new ordinary shares which were offered to shareholders at 40s 6d having been considerably over-subscribed. The price is now about 3d premium.

Lucas Assets

As in the case of Imperial Chemical Industries mentioned above, Joseph Lucas, Ltd., made an estimate last year of the replacement value of the fixed assets, although they did not go so far as to take the resultant figures into the balance-sheet. They were given, instead, as a footnote in the annual accounts and placed a value of £26¼ million on land, buildings, plant and vehicles carried in the books at £4½ million. Market calculations based on the larger sum, plus the formidable total of £15¾ million represented by net current assets, conclude that the ordinary capital is backed by assets equal to some £6 per share, which compares with the present market quotation of 32s 6d.

B.I.C.C. Capital

Full details of the issue of over three millions new £1 ordinary shares by British Insulated Callender's Cables will not be circulated until near the end of the month; but, in the meantime, shareholders are advised that they are to be offered one new share by way of rights at 22s for every three £1 stock units now held. At the time of this announcement, the latter were (and still are) quoted at 27s, at which level the rights to the offer had a value of 1s 3d per present share. This preliminary notice was made, of course, without knowledge of how the industrial market situation might be altered by last Tuesday's revelations.

Company News

Ericsson Telephones' decision to maintain the dividend for 1951 at a total of 22 per cent tax free represents a moderate increase on last year's payment, which was at the same rate but on smaller capital. Net profit after tax is stated to be £100,000 lower at £431,000, but still covers handsomely the amounts distributed in dividend: the outlook for this year is reported as satisfactory, subject to the familiar proviso about raw material supplies. Midland Electric Manufacturing is continuing its conservative dividend policy in repeating the dividend at 15 per cent out of increased profits. The Morphy-Richards interim dividend of 15 per cent is the same rate as before, but applies to capital as increased by last December's issues.

Capital Issues

The price of 4s 6d at which Decca Record's new 1s ordinary shares are being offered to present shareholders was far enough below the market level for the company to dispense with underwriting arrangements and expenses. With the new shares at a premium of about 13s in the week before the Budget, this is a case where shareholders should note the invitation to apply for any "excess" shares not subscribed for in the way of rights. The new shares will not rank for the final dividend, due now, for the year ended in March of last year. English Electric's proposal to raise the ordinary capital by another £2 million concerns at present only the amount authorized: there is no present intention to make a further issue. Full accounts of the company showed overdrafts of £7 million outstanding at the end of the year, but the figure will since have been reduced by over £3½ million as a result of the debenture and share issues.

Electrical Investments

Past Week's Price Changes

Company	Dividend Previous	Dividend Last	Middle Price Mar. 10 1952	Week's Rise or Fall	Est. Yield p.c. £	s	d
Overseas Electricity Companies							
Atlas Elec. ..	3	4	18/3	+3d	4	7	9
Calcutta Elec. ..	6†	6†	20/-	—	6	0	0†
Cawnpore Elec. ..	—	—	26/3	−1/8		—	
East African Power	7	7	31/3	—	4	9	7
Jerusalem Elec. ..	—	—	10/6	+1/-		Nil	
Madras Elec. ..	—	—	23/3	−6d		—	
Nigerian Elec. ..	10	10	26/6	−1/6	7	11	0
Palestine Elec. "A"	5†	5†	14/6	−1/-	6	18	0†
Perak Hydro-Elec.	Nil	Nil	12/6	—		—	
Equipment and Manufacturing							
Aberdare Cables(5/-)	20	20	11/9	—	8	10	2
Aerialite (1/-) ..	83¼	88½	8/9	—	10	2	0
Aron Elec. Ord. ..	15	15	33/9	−⅛	8	17	9
Assoc. Elec. Ord.	20	20	72/6	—	5	10	4
Automatic Tel.& El.	12½	15	55/-	+1/-	5	9	1
Babcock & Wilcox	15	18	67/6	+2/3	5	6	6
Baldwin, H. J. (2/-)	25	25	5/-	—	10	0	0
British Aluminium	10	10	34/9	—	5	15	0
B.I. Callender's ..	6⅜	7½	27/-	—	5	11	1
British Thermostat (5/-)	30	30	27/-	−6d	5	11	0
British Vac.Cleaner (5/-)	20	25	15/-	+1/-	8	6	8
Brush Ord. (5/-) ..	10	10	5/6	+3d	9	1	9
Burco (5/-) ..	42½	38¾	20/9	—	9	6	8
Chloride El.Storage	12½	15	60/-	+1/8	5	0	0
Cole, E. K. (5/-) ..	20	25	15/-	—	6	13	4*
Cossor, A. C. (5/-)	Nil	Nil	11/-	+3d		—	
Crabtree (10/-) ..	17½	17½	32/6	−6d	5	7	9
Crompton Parkinson Ord. (5/-) ..	11¼	11¼	9/-	+3d	6	5	0
De La Rue (5/-) ..	50	50	33/9	+⅛	7	8	3
Decca (1/-) ..	112½	112½	17/-xr	—	6	12	0
E.M.I. (10/-) ..	8	12	15/9	+6d	7	12	3
Electrical Components (5/-) ..	20	20	11/3	—	8	17	10
Elec. Construction	15	15	47/6	−⅛	6	6	3
Enfield Cable Ord.	7½	7½	26/-	—	5	15	5
English Electric ..	15	15	56/9	+1/9	5	5	9
Ericsson Tel. (5/-)	22†	22†*	38/9	+1/8	2	16	9†
Ever Ready (5/-)	35	35	25/6	—	6	17	3
Falk Stadelmann	15	15	40/-	—	7	10	0
G.E.C. Ord. ..	17½	22½	76/3	+3/3	5	18	0
General Cables (5/-)	38	30*	17/6	—	8	11	6
Greenwood & Batley	15	15	45/-	−1/6	6	13	4
Hackbridge Cable (5/-)	20	20	10/3	+6d	9	15	0
HackbridgeHewittic (5/-)	15	18	15/6	+6d	5	16	3
Hall Tel. Acc. (10/-)	10	10	12/-	—	8	6	8
Heatrae (2/-) ..	12½	12½	4/-	—	6	5	0
Henleys (5/-) ..	20	20	18/6	+6d	5	8	1
Hoover (5/-) ..	37½	35*	27/6	+1/9	6	7	3
Intl. Combustion (5/-)	20	25	21/-	−3d	5	19	0
Johnson & Phillips	15	15	48/9	—	6	3	0

Company	Dividend Previous	Dividend Last	Middle Price Mar. 10 1952	Week's Rise or Fall	Est. Yield £	s	d
Equipment and Manufacturing (continued)							
Lancashire Dynamo	22½	22½	40/-	—	5	12	6*
Laurence, Scott(5/-)	12½	12½	10/6	−1/8	5	9	0
London Elec. Wire	10	10	38/9	—	5	3	3
J. Lucas	17½	7½*	32/6	—	4	12	4
Mather & Platt ..	11	12½	43/9	+3/-	5	14	3
Metal Industries ..	10	10	35/9	—	5	11	9
Mid. Elec. Mfg. ..	15	15	53/9	−5/8	5	11	6
Murex	10	12½	48/-	+2/-	5	1	3
Newman Ind. (2/-)	10	6	2/9	—		—	
Oldham & Son (1/-)	30	30	4/3	+6d	7	1	3
Parsons, C. A. ..	15	15	46/3	+6d	3	1	8*
Plessey (5/-) ..	20	22½	17/6	−9d	6	8	6
Pye Deferred (5/-)	35	18*	17/-	—	5	6	0
Revo (10/-)	27½	27½	32/6	—	8	9	3
Reyrolle	15	15	41/9	—	3	11	9
Scot. Cable (4/-) ..	30	30	20/3	—	5	18	5
Siemens Ord. ..	7½	10	33/9	+1/9	5	18	6
Switchgear & Cowans (5/-)	20	22½	13/-	−6d	8	13	3
T.C.C. (10/-) ..	15	20	46/-	—	4	7	0
T.C. & M. ..	9*	10*	35/-	—	5	14	3
TelephoneMfg.(5/-)	10	10	7/6	—	6	13	4
Thorn Elec. (5/-)..	20	10*	7/9	−6d	6	9	0
Tube Investments	25	25	5⅛	+⅛	4	17	6
Vactric (5/-) ..	Nil	Nil	6/9	+1/9		—	
Veritys (5/-) ..	2½	Nil	3/6	—		Nil	
Walsall Conduits (4/-)	70	70	48/9	—	6	0	2
Ward & Goldstone (5/-)	44	45*	36/3	−5/3	6	0	0
Watford (2/-) ..	20	25	5/6	−3d	9	1	9
Westinghouse Brake	14	14	47/6	+1/6	5	18	0
West, Allen (5/-)	10	12½	10/-	+3d	6	5	0
Transport and Communications							
Anglo-Am. Tel.: A Ord.	—	—	84½	−⅛		—	
Ord.	—	—	58	−2		—	
Anglo-Portuguese	8	8	21/3	—	7	10	7
Brit. Elec. Traction: Def. Ord. ..	22½	25	375	—	6	13	4
Cable & Wireless: Ord.	6	8	119½	—	6	14	0
4% Loan ..	4	4	95	+½	4	4	3
Calcutta Trams ..	6†	6†	23/-	—	5	4	4†
Cape Elec. Trams	4	5	14/-	−1/-	7	2	9
Globe Tel. & Tel. Ord.	—	—	25/-	−1/6		—	
Great Northern Tel. (£10)	7½	8	11½	+1½	7	2	3
Inter. Tel. & Tel.	Nil	15cts	33½	+2½		—	
Marconi Marine ..	7½	10	31/3	—	6	8	0
Oriental Tel. Ord.	16	16	46/3	+1/9		—	
Telephone Props.	7	8	29/3	+6d	5	9	6
Tele. Rentals (5/-)	10	10	8/3	+6d	6	1	3

* After capital bonus.
† Dividends are paid free of Income Tax.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s 8d each including postage) will be obtainable after 23rd April from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1946

23111 & 23129. Kesl, K.—Electric contact arrangements particularly adapted for use with electromagnetic circuit breakers. 24th July, 1946. Convention date not granted. (670558/9.)

23851. Taylor, F. J. D., and Tucker, D. G.—Frequency control systems for electric oscillation generators. 27th October, 1947. (670562.) 31165.—Apparatus for the testing, measuring and/or control of electric transmission in carrier-wave systems. 15th October, 1947. (670563.)

24809. Bull, C. S., and Atherton, A. H.—Electron discharge devices employing secondary electron emission and electrodes for use therein. 26th October, 1948. Divided out of 670554. (670561.)

1947

17991. Board of Trustees of Leland Stanford Junior University.—Electron-discharge apparatus. 12th November, 1941. Divided out of 670551. (670571.)

19200. Kesl, K.—Electric contact arrangements particularly adapted for use with electromagnetic circuit breakers. 24th July, 1946. Divided out of 670558. (670572.)

22973. Thomson, C. S., and Spratt, C. H.—Electrically energized luminous gas devices. 10th December, 1948. (670694.)

24823. Telefonaktiebolaget L. M. Ericsson.—Circuit arrangements for electric discharge device. 30th December, 1947. (670578.)

1948

2279. Bayard, H. M., and Roquet, R. J. C.—Apparatus for compensating for telegraph distortion. 26th January, 1948. (670579.)

3547. Automatic Electric Laboratories, Inc.—Relay controlled cross-bar switch and telephone system. 6th February, 1948. (670695.)

7843. Pye, Ltd., Jackson, D., and Green, J. D. F.—Television cameras. 10th March, 1949. Cognate application 32765, 17th December, 1948. (670581.)

9301/2. Bull, C. S., and Atherton, A. H.—Electron discharge devices employing secondary electron emission and electrodes for use therein. 26th October, 1946. Divided out of 670554. (670582/3.)

10768. British Thomson-Houston Co., Ltd.—Electric valve control circuits. 19th April, 1948. (670584.)

11182. Standard Telephones & Cables, Ltd., and Pocock, L. C.—Granule-type electro-acoustic transducers. 22nd April, 1949. (670585.)

11184. Standard Telephones & Cables, Ltd., and Skelton, D. E.—Granule-type electro-acoustic transducers. 22nd April, 1949. (670586.)

13551. British Thomson-Houston Co., Ltd., and Gullick, O. F.—Regulation of high-frequency oscillators. 17th May, 1949. (670498.)

21153. Allingham, R. A., and Jeffree, A. F.—Electronic valve circuit. 11th August, 1948. (670618.)

28040. Thermionic Products, Ltd. (Brush Development Co.).—Magnetic recording or reproducing apparatus. 28th October, 1948. (670591.)

28619/0. Birmingham Small Arms Co., Ltd., and Goldschmidt, R.—Electric generators. 4th November, 1949. (670627/8.)

29508. Bull, C. S., and Atherton, A. H.—Electron discharge devices employing secondary electron emission and electrodes for use therein. 26th October, 1946. Divided out of 670554. (670593.)

30986. Stevens, A. H. (Board of Trustees of Leland Stanford Junior University).—Apparatus for obtaining ultra-high-frequency energy. 12th November, 1941. Divided out of 670551. Convention date not granted. (670594.)

31576. Soc. Italiana E. Breda per Costruzioni Meccaniche.—Dynamo-electric machine for regulation. 6th December, 1948. (670782.)

32177. British Thomson-Houston Co., Ltd. (General Electric Co.).—Radio detection and ranging systems. 13th December, 1948. (670631.)

1949

167. Shardlow Electric Wires, Ltd., and Moulton, E. W.—Mountings for rod aerials. 3rd February, 1950. (670704.)

205. Zenith Radio Corporation.—Electron discharge devices. 4th January, 1949. Cognate applications 206, 18th March, 1948, and 207, 19th March, 1948. (670636.)

2465. Radio Corporation of America.—Super-regenerative receiver. 28th January, 1949. (670784.)

4824. Cleveland, F. J. (Bendix Aviation Corporation).—Dynamo-electric machines. 22nd February, 1949. (670649.)

5050. Strong Illuminating Engineering Co., Ltd., and Aldrich, E. C.—Vapour-proof electric lighting fittings. 24th February, 1950. (670709.)

7961. Wild-Barfield Electric Furnaces, Ltd., Barfield, R. H., and Gibbs, M. G.—High-frequency heating of metal surfaces. 17th March, 1950. (670652.)

8291. Erskine, Heap & Co., Ltd., and Allcock, W.—Electric oil circuit breakers. 20th March, 1950. (670653.)

10732. Shardlow Electric Wires, Ltd., and Moulton, E. W.—Method of and means for suppressing or reducing interference in radio receiving apparatus. 30th June, 1950. (670510.)

11920. Wennberg, O. C. G., and Wennberg, C. E. S.—Controlling electrically propelled lift-trucks. 4th May, 1949. (670512.)

13511. English Electric Co., Ltd.—Axle suspended traction motors. 30th June, 1950. (670791.)

15511. Western Electric Co., Inc.—Photo-electric apparatus employing semi-conductive bodies. 10th June, 1949. (670730.)

17840. English Electric Co., Ltd.—Liquid-cooled electrical apparatus. 5th July, 1950. (670800.)

17864. British Electric Resistance Co., Ltd., and Huhne, H. P.—Electric resistance apparatus. 12th July, 1950. (670659.)

17896. Southern Instruments, Ltd., and Colls, J. A.—Direct coupled thermionic valve amplifiers. 24th May, 1950. (670801.)

18048. Automatic Telephone & Electric Co., Ltd.—Telephone systems. 6th June, 1950. (670660.)

18369. Akt.-Ges. Brown, Boveri & Cie.—Arrangement for switching-in gas blast circuit breakers. 12th July, 1949. (670661.)

19254. General Electric Co., Ltd., Bryden, J. E., Easter, B., and Watkins, T. B.—Apparatus for generating electrical oscillations. 16th October, 1950. (670739.)

19667. Marconi's Wireless Telegraph Co., Ltd.—Radio direction finders. 6th June, 1950. (670741.)

19981. Sperry Gyroscope Co., Ltd., and Dove, F.—Apparatus for measuring the slip of an alternating current induction motor. 14th July, 1950. (670530.)

20415. Westinghouse Electric International Co.—Electric motor control systems. 5th August, 1949. (670533.)

20836. Metropolitan-Vickers Electrical Co., Ltd.—Alternating current electric measuring circuit arrangements. 4th July, 1950. Cognate application 22283, 26th August, 1949. (670536.)

21154. Pye, Ltd., and Coleman, D. R.—Cameras, particularly television cameras. 6th October, 1950. (670602.)

21434. Reproducers & Amplifiers, Ltd., and Willson, H. C.—Moving-coil loudspeakers. 9th October, 1950. (670667.)

21620. National Research Development Corporation.—Photo-electric densitometer apparatus. 6th October, 1950. (670748.)

21791. Rolls-Royce, Ltd.—Anodic electro-polishing of metal parts. 22nd August, 1950. (670542.)

21959. Electric & Musical Industries, Ltd.—Mixing devices. 29th March, 1950. (670543.)

22223. Westinghouse Electric International Co.—Control systems for electric motors. 26th August, 1949. (670545.)

22755. Westinghouse Electric International Co.—Method of insulating electrical coils. 2nd September, 1949. Cognate application 22756, 18th February, 1949. (670548.)

22807. General Electric Co., Ltd.—Thermionic valve integrating circuits. 21st August, 1950. (670671.)

24462. Naamlooze Vennootschap Koninklijke Metaal-Warenfabrieken Voorheen J. N. Daalderop & Zonen.—Temperature responsive electric relay. 23rd September, 1949. (670804.)

24891. McGeoch & Co., Ltd., W., and Watt, H. S.—Electric plug-and-switch socket. 23rd October, 1950. (670805.)

25109. Standard Telephones & Cables, Ltd.—Crystal valves. 29th September, 1950. (670807.)

25186/7. Teletype Corporation.—Multiplex telegraph apparatus. (670758/9.) 25188.—Electrical synchronizing apparatus. (670760.) 25189.—Electrical start-stop to multiplex telegraph signal convertor. (670761.) 25190.—Electrical multiplex to start-stop telegraph signal convertors. 30th September, 1949. (670762.)

25646. Communications Patents, Ltd., Bazin, R. E., and Downing, R. K.—High-frequency dielectric seaming apparatus for use in producing hollow structures from dielectric sheet material. 5th January, 1951. (670808.)

25785. Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—Control circuits for use in automatic signalling systems. 7th October, 1949. (670763.)

25853. Brown, W. J.—Electrical voltage splitting circuit arrangements. 7th October, 1949. (670677.)

26327. General Electric Co., Ltd., and Williams, C. E.—Electrical apparatus comprising saturable chokes. 13th October, 1950. (670680.)

26623. Howard, G. J. E.—Magnetic couplings. 28th September, 1950. (670682.)

28118. General Electric Co., Ltd., and Watkins, T. B.—Electrical oscillation generators. 31st October, 1950. (670765.)

28611. General Electric Co., Ltd., and Bloch, A.—Magnetic fluids. 8th November, 1950. (670818.)

29346. British Thomson-Houston Co., Ltd.—Amplitude comparison circuits. 16th November, 1949. (670823.)

29376. Rowland, T.—Means for protecting or safeguarding fluorescent lighting tubes. 30th October, 1950. (670824.)

30642. British Insulated Callender's Cables, Ltd., and Baker, H. A.—Hand tools for cutting the sheaths of metallic sheathed electric cables. 28th November, 1950. (670829.)

31417. General Electric Co., Ltd., Beggs, S. S., and Hubbold, S.—Lighting fittings. 7th December, 1950. (670766.)

32351. British Thomson-Houston Co., Ltd.—Magnetic saturation devices. 16th December, 1949. (670838.)

32626. British Thomson-Houston Co., Ltd., and Lambert, G. K.—Street lighting lanterns. 4th September, 1950. (670840.)

32747. Soudure Autogene Française.—Method and apparatus for depositing of metal by electric arc. 21st December, 1949. Cognate application 32748, 1st September, 1949. (670603.)

32878. Minister of Supply.—Electric remote control systems. 27th October, 1950. (670841.)

33245. Zenith Radio Corporation.—Electron discharge devices. 29th December, 1949. (670690.)

1950

6361. Standard Telephones & Cables, Ltd.—Alarm arrangements for radio repeaters. 14th March, 1950. (670404.)

9744. British Thomson-Houston Co., Ltd.—Means for controlling a member of great length for use with wave-guides. 20th April, 1950. (Addition to 668782.) (67[illegible]6.)

11926. Grigsby-Allison Co., Inc.—Multiple section electric switch assemblies. 12th May, 1950. (670[illegible].)

11930. Murphy Radio, Ltd., Cullen, P. C., Wolsey, C. L., and Smith, R. B.—Radio receiving sets. 14th November, 1946. Cognate application 12749, 22nd May, 1945. Divided out of 18197/44. (670851.)

12361. Time, Inc.—Electrical compression networks. 17th May, 1950. (670170.)

13215. British Thomson-Houston Co., Ltd., Sharp, H., and Petch, T. H.—Braking of induction motors. 16th November, 1950. (670856.)

14443. Philips Electrical Industries, Ltd.—Circuit arrangements for use in automatic signalling systems for selectively marking the outlets of a group of switches. 9th June, 1950. (670770.)

16103. Bull, C. S., and Atherton, A. H.—Electron discharge devices employing secondary electron emission and electrodes for use therein. 26th October, 1946. Divided out of 670561. (670607.)

19317. Pye, Ltd., Jackson, D., and Green, J. D. F.—Cameras, particularly television cameras. 10th March, 1949. Cognate application 19318, 17th December, 1948. Divided out of 670581. (670608.)

28425 & 29748. Bertele, H. C.—Metal vapour electric discharge apparatus. 16th April, 1948. (Divided out of and addition to 670416.) (670485/6.)

30584. Westinghouse Brake & Signal Co., Ltd., Peter, L. H., Jenkins, A., and Garrod, K. A.—Dry contact rectifiers. 12th October, 1949. (Divided out of 670421.) (670487.)

31190. O'Shei, W. E.—Electric festoon lamps for vehicle direction indicators. 6th July, 1949. (Divided out of 670323.) (670410.)

BOOKS RECOMMENDED BY

ELECTRICAL REVIEW

RADIO LABORATORY HANDBOOK
By M. G. Scroggie, B.Sc., M.I.E.E.
5th Edition 15s. net. By post 15s. 5d.

MICROPHONES
A B.B.C. Engineering Training Manual. By the Staff of Engineering Training Dept., B.B.C.
15s. net. By post 15s. 5d.

TELEVISION RECEIVING EQUIPMENT
By W. T. Cocking, M.I.E.E.
3rd Edition 18s. net. By post 18s. 8d.

HARDFACING BY WELDING
By M. Riddihough, M.Met., A.R.I.C., F.I.M.
8s. 6d. net. By post 8s. 10d.

Obtainable at all booksellers or direct from:
The Publishing Dept., Dorset House, Stamford Street, London, S.E.1

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Australia.—SYDNEY.—20th March. County Council. Busbars and electrical fittings for asbestos cement enclosed switchboards. (C.R.E. 7243/52. Ten/3676.)*

MELBOURNE.—20th August. Victoria Railway Commissioners. Supply of 90 second-class motor cars complete; 90 first-class and 30 second-class trailer cars complete; and spare parts. (C.R.E. 8077/52. Ten/3693.)*

Blackpool.—31st March. Town Council. Electrical installation for the erection of St. Paul's County Infants' School. A. Hamilton, borough surveyor, Municipal Buildings.

Bromsgrove.—22nd March. U.D.C. Supply of 114 electric cookers and electric wash boilers to Charford estate No 4. Surveyor, Council House.

Edinburgh.—North of Scotland Hydro-Electric Board. 132 kV and 33 kV transmission lines. (See this issue.)

India.—MADRAS.—15th April. Government Department of Electricity. Supply of high voltage control and metering cubicles. (C.R.E. 7753/52. Ten/3665.)*

NEW DELHI.—Kashmir Trade Commissioner. Supply of hydro-electric generating sets ranging from 150 to 300 kW each for generating stations at Seer, Panchpora and Marbug. (C.R.E. 8442/52. Ten/3685.)*

Knaresborough.—5th April. U.D.C. Electrical installations in 62 houses on Meadowside House estate, Scheme 2. Surveyor, Knaresborough.

Preston.—Corporation. Electrical installation at Larches County Primary School. (See this issue.)

Uruguay. — MONTEVIDEO. — 15th April. Administracion General de las Usinas Electricas y Telefonos del Estado. Protective apparatus for overhead lines. (C.R.E. 7259/52. Ten/3677.)*

Wakefield.—West Riding County Council. Electrical installation contractors wishing to be included in the County Council's lists of selected contractors must submit applications by 7th April. (See this issue.)

West Hartlepool.—Town Council. Electrical installation at the Briarfields Residential Home. Borough architect, Municipal Buildings.

*Specifications may be inspected at the Commercial Relations and Exports Department, Board of Trade, Horse Guards Avenue, Whitehall, S.W.1 (Trafalgar 8855).

CONTRACTS IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Arnold.—Primary school for Notts E.C.; Gregory & Bartlett, architects, Castle Gate Chambers, Nottingham.

Barnes.—Five shops with 15 flats, Mortlake High Street; W. R. Shepherd, borough surveyor, Sheen Lane, S.W.14.

Barton-on-Humber.—Dwellings on land adjoining Bowmandale for U.D.C.; clerk of works, Barton-on-Humber.

Beddington (Surrey). — Adaptations to Royal Female Orphanage (£32,060) for Surrey C.C.; county architect, Kingston-on-Thames.

Bedford.—Flats (24), Eastcotts Road estate; Wm. Bushby, Ltd. Houses (24), Eastcotts Road estate; Gambriel & Sugars. Houses (24), on Old Ford End Road estate; Besbuilt, Ltd. All of Bedford.

Bradford.—Fire station, Highfield Road, Idle; city architect.

Braintree. — New John Bunyan County Infants' School (£56,880) for Essex E.C.; H. Potter, Ltd., builders, Fairfield Road, Chelmsford.

Brandon.—Houses (60), Esh Winning; U.D.C. surveyor.

Brighouse.—Houses (34), Field Lane, Rastrick; borough surveyor, Commercial Street.

Cardiff.—Four-storey building for municipal offices, etc.; city engineer, City Hall.

Carshalton.—St. Peter's Technical Institute, first section (£103,560), for Surrey C.C.; Thorogood & Sons, builders, Bond Street, Surbiton.

Cheltenham.—Houses (31), Knapp estate, Charlton Kings; Rainger, Rogers & Smithson, architects, 29, Rodney Street.

Chester.—Houses (73), Blacon; Thos. Warrington & Sons, Ltd., Park Drive, Hoole, Chester.

Clayton-le-Moors. — Houses (100), Field Bottoms site, for U.D.C.; Fielding & Son, Blackpool.

Colchester.—Four-storey classrooms, workshop block, etc., North East Essex Technical College (£110,000); county architect, County Hall, Chelmsford.

Corby.—Houses (200) for U.D.C.; Sherriff & Co., Ltd., Leicester.

Dagenham.—Flats (42), Dagenham Road; town clerk, Civic Centre.

Derby. — Erection of new Chaddesden Secondary Modern School; county architect, St. Mary's Gate, Derby.

Droxford.—Houses (180), Bishops Waltham and Denmead; surveyor, Rural Council Offices, Bishops Waltham.

Durham. — Fire brigade headquarters at Durham City (£28,000); Thomas Armstrong, Ltd., builders, Robson Street, Newcastle-on-Tyne.

Dursley.—Houses (41), Woodfield estate; R.D.C. surveyor, Council Offices, Kingshill, Dursley, Glos.

Egham.—Administration block at Secondary School (£40,000); county architect, Kingston-on-Thames.

Feltham.—Dwellings (25), Grove Nursery and Swan Road, Hanworth; surveyor, Lynton House, Hanworth Road.

Formby.—Fire station, Church Road; Lancashire county architect, County Offices, Preston.

Gateshead.—Factory, offices, etc., Hawks Road for Gibson Readymixed Concrete, Ltd., Gosforth, Northumberland.

Huddersfield.—Nursery at Fieldhead Children's Home (£22,500); borough architect.

Kettering.—Demolition of temporary fire station buildings in Headlands and erection of new headquarters; county architect, Northampton.

Kirkham.—Houses, Freckleton Street, for U.D.C.; Bowden & Chadderton, Fleetwood Road, Thornton, Lancs.

Lancing.—Junior and infants' schools (£54,600) for West Sussex E.C.; county architect, County Hall, Chichester.

Leamington Spa.—Factory at Princes Drive for Sidney Flavel & Co., Ltd.; B. Reyner, architect, 5, Manor Road, Coventry.

Leicester.—Houses at Eyres Monsell estate for T.C.; Frank Ellson, Ltd., New Street, Oadby (24); W. W. Ward, Paget Street, Aylestone (22); and Wilson & Barrett, 41, Bretby Road, Leicester (30).

Leigh.—Erection of Nel Pan Lane Primary School; W. J. Bickerstaffe & Sons, Seven Stars Bridge, Wigan.

Lindsey.—Priory Lane County Junior School, Ashby (£53,069) and Redcombe Road Secondary Modern School, Brigg; county architect, Lincoln.

Liverpool.—Proposed new corn exchange on site in Brunswick Street; E. Davies & Sons, architects, 18, Harrington Street, Liverpool.

Houses (24), Willow Green, for Heathside Estates, Ltd.; A. E. Shennan, architect, 17, North John Street, Liverpool.

Manchester.—Extensions to premises, Wythenshawe estate, for Allied Dairies, Ltd.; Brameld & Smith, architects, 284, Corn Exchange Buildings, Manchester.

Matlock.—Central bus station, Bateman's Park, Bakewell Road, for U.D.C.; J. Wildgoose & Sons, builders, Industrial Works, Matlock.

Middleton.—New primary school at Bowlee (£78,341); P. Hamer, Ltd., 15, Park Street, Swinton.

Newcastle-on-Tyne.—Houses (22), Winchcombie Place; A. Potts, builder, Heaton Road.

Houses (14), Meridian Way; J. T. Bell & Son, builders, Northumberland Place.

North Shields.—Passenger terminal on Tyne Commission Quay for the Bergen Steamship Co. (£27,000); Edwards & Manby, architects, 22, Eldon Place, Newcastle.

Oswestry.—Houses (20), Whittington, for R.D.C.; F. Roberts & Sons, Ltd., Oswestry.

Rochdale.—Erection of Kirkholt Secondary Modern School in 1952 programme; borough engineer.

Rushden.—Flats (32), for U.D.C.; Robert Marriott, Ltd., Higham Road, Rushden.

St. Albans.—Flats and shops, St. Julian's and New Green estates; city engineer.

Scunthorpe.—Houses, New Brumby estate; borough architect.

Sheffield.—Factory at Carlisle Street for Davenport Bros., Ltd.; F. Clifton, 17, Jepson Road, Sheffield.

Slaithwaite.—Rebuilding oil works; J. Haigh & Co., Ltd., Clayfield Works.

Sleaford (Lincs).—Houses (26), Galley Hill estate, for U.D.C.; Drury & Co., Ltd., Hillside estate, Sleaford.

Smethwick.—Slipper baths at Cape Hill for B.C.; Reuben Holbrow & Partners, quantity surveyors.

Stalybridge.—Houses (24), Stamford Park estate and Oakwood estate; Howard & Benson, architects, 88, Mosley Street, Manchester.

Staveley. — Housing estate layout plan approved for 300 homes at Norbrigg; architect to Council, Staveley, Derbyshire.

Wednesfield. — Dwellings (80), Lichfield Road; U.D.C. surveyor, 29, Bolton Road, Wednesfield, near Wolverhampton.

Wetherby.—Houses (67), Hallfield estate; Needham, Thorpe & White, architects to R.D.C., 6, High Petergate, York.

Wisbech.—Infants' school in Lerowe Road (£52,288); Bettles Building Co., Ltd., Peterborough.

Woking. — County primary school, West Byfleet (£46,500) for Surrey E.C.; county architect, Kingston-on-Thames.

Wolverhampton. — Flats (18), Tettenhall No. 2 site; A. F. R. Godfrey & Co., Ltd., 10, Clifton Street.

Worksop.—Houses (36), Carlton, for R.D.C.; Dernie & Bell, 17, Mount Avenue.

Wrexham.—Dwellings (301), Queens Park estate; Thos. Warrington & Sons, Ltd., 84, Station Road, Ellesmere Port, Wirral, Ches.

Yeovil. — Houses (34), Larkhill; Petter, Warren & Roydon Cooper, architects to T.C., West Handford.

Yorks (East Riding).—County secondary school, Harland Way, Cottingham, for E.C.; county architect, County Hall, Beverley.